STATE OF NEW HAMPSHIRE
INTER-DEPARTMENT COMMUNICATION

DATE: March 8, 2023

FROM: Andrew O'Sullivan
Wetlands Program Manager

AT (OFFICE): Department of Transportation
Bureau of Environment

SUBJECT Dredge & Fill Application
Warner -Sutton 15747

TO: Karl Benedict, Public Works Permitting Officer
New Hampshire Wetlands Bureau
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

Forwarded herewith is the application package prepared by NH DOT Bureau of Highway Design for the subject major impact project. The Warner-Sutton 15747 project is located along I-89 NB and SB from approximately MM 20.5 to MM 24.2. The purpose of this project is to rehabilitate the existing pavement; replace or rehabilitate aged drainage, guardrail, and signs; and improve safety. Impacts associated with tree clearing are necessary for access to the inlet or outlet of drainage structures and other work areas, as well as improved sight lines to signs.

This project was reviewed at the Natural Resource Agency Coordination Meeting. A copy of the minutes has been included with this application package. A copy of this application and plans can be accessed on the Departments website via the following link: http://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/wetland-applications.htm.

NHDOT anticipates and request that this project be reviewed and permitted by the Army Corp of Engineers through the State Programmatic General Permit process. A copy of the application has been sent to the Army Corp of Engineers.

Mitigation was determined to be required for the project.

The lead people to contact for this project are David Scott, Bureau of Highway Design (271-0556 or Corey.Spetelunas@dot.nh.gov) or Andrew O'Sullivan, Wetlands Program Manager, Bureau of Environment (271-3226 or Andrew.O'Sullivan@dot.nh.gov).

A payment voucher has been processed for this application (Voucher #712122) in the amount of $10,794.

If and when this application meets with the approval of the Bureau, please send the permit directly to Andrew O'Sullivan, Wetlands Program Manager, Bureau of Environment.

AMO:
cc:
BOE Original
Town of Warner (4 copies via certified mail)
Town of Sutton (4 copies via certified mail)
David Trubey, NH Division of Historic Resources (Cultural Review Within)
John Magee, NH Fish & Game (via electronic notification)
Maria Tur, US Fish & Wildlife (via electronic notification)
Jeanie Brochi, US Environmental Protection Agency (via electronic notification)
Michael Hicks US Army Corp of Engineers (via electronic notification)
Kevin Nyhan, BOE (via electronic notification)

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STANDARD DREDGE AND FILL WETLANDS PERMIT APPLICATION

Water Division/Land Resources Management
Wetlands Bureau

Check the Status of your Application

RSA/Rule: RSA 482-A/Env-Wt 100-900

APPLICANT'S NAME: **NH Department of Transportation** **TOWN NAME:** Warner-Sutton

Administrative Use Only	Administrative Use Only	Administrative Use Only	File No.:
			Check No.:
			Amount:
			Initials:

A person may request a waiver of the requirements in Rules Env-Wt 100-900 to accommodate situations where strict adherence to the requirements would not be in the best interest of the public or the environment but is still in compliance with RSA 482-A. A person may also request a waiver of the standards for existing dwellings over water pursuant to RSA 482-A:26, III(b). For more information, please consult the Waiver Request Form.

SECTION 1 - REQUIRED PLANNING FOR ALL PROJECTS (Env-Wt 306.05; RSA 482-A:3, I(d)(2))

Please use the Wetland Permit Planning Tool (WPPT), the Natural Heritage Bureau (NHB) DataCheck Tool, the Aquatic Restoration Mapper, or other sources to assist in identifying key features such as: priority resource areas (PRAs), protected species or habitats, coastal areas, designated rivers, or designated prime wetlands.

Has the required planning been completed?	☒ Yes ☐ No
Does the property contain a PRA? If yes, provide the following information:	☐ Yes ☒ No
• Does the project qualify for an Impact Classification Adjustment (e.g. NH Fish and Game Department (NHF&G) and NHB agreement for a classification downgrade) or a Project-Type Exception (e.g. Maintenance or Statutory Permit-by-Notification (SPN) project)? See Env-Wt 407.02 and Env-Wt 407.04.	☐ Yes ☒ No

• Protected species or habitat?
  ○ If yes, species or habitat name(s):
  ○ NHB Project ID #: NHB22-3659
	☐ Yes ☒ No

• Bog?	☐ Yes ☒ No
• Floodplain wetland contiguous to a tier 3 or higher watercourse?	☐ Yes ☒ No
• Designated prime wetland or duly-established 100-foot buffer?	☐ Yes ☒ No
• Sand dune, tidal wetland, tidal water, or undeveloped tidal buffer zone?	☐ Yes ☒ No
Is the property within a Designated River corridor? If yes, provide the following information: • Name of Local River Management Advisory Committee (LAC): • A copy of the application was sent to the LAC on Month: Day: Year:	☐ Yes ☒ No

For dredging projects, is the subject property contaminated? • If yes, list contaminant:	☐ Yes ☒ No
Is there potential to impact impaired waters, class A waters, or outstanding resource waters?	☐ Yes ☒ No
For stream crossing projects, provide watershed size (see WPPT or Stream Stats): 6 Tier 1 (ac): 25.6, 20.2, 20.5, 55.7, 66.0, 80.0	

SECTION 2 - PROJECT DESCRIPTION (Env-Wt 311.04(i))

Provide a **brief** description of the project and the purpose of the project, outlining the scope of work to be performed and whether impacts are temporary or permanent. DO NOT reply "See attached"; please use the space provided below.

The Warner-Sutton 15747 project is located along I-89 NB and SB from approximately MM 20.5 to MM 24.2. The purpose of this project is to rehabilitate the existing pavement; replace or rehabilitate aged drainage, guardrail and signs; and improve safety.

Impacts associated with tree clearing are necessary for access to the inlet or outlet of drainage structures and other work areas, as well as improved sight lines to signs. These impacts will be considered permanent when grubbed otherwise considered temporary. Impacts associated with slope work are necessary for shoulder pavement widening of I-89 mainline, and for two construction access roads. The shoulder pavement widening will require minor widening of roadway embankments in these areas. The construction access roads are necessary for access to two culverts located at the bottom of steep wooded slopes. These fill impacts are shown within this application as permanent impacts.

One of the five tier 1 stream crossings will be rehabilitated with UV cured-in-place-pipe (CIPP). Another will have existing beaver deterrent fencing replaced with a new beaver deterrent system. All but one of the tier 1 stream crossings will include perch repair at the outlet and several will have headwalls replaced. There are four additional proposed UV CIPP locations and other culvert locations with proposed inlet or outlet channel improvements. The impacts associated with new stone fill for outlet channel protection or perch repairs for the work noted above are included as permanent impacts.

There are numerous locations where there will be permanent or temporary impacts from replacing the existing combined perforated underdrain/storm pipes with separate underdrains and storm drain systems which will include new catch basins, headwalls and stone outlet protection.

There are 30 locations which qualify and will be permitted through NHDES Certified Culvert Maintainer Program (CCMP). CCMP locations are labeled on the plans as DNXX-CCMP.

SECTION 3 - PROJECT LOCATION

Separate wetland permit applications must be submitted for each municipality within which wetland impacts occur.

ADDRESS: Interstate 89, MM 20.5 to MM 24.2

TOWN/CITY: Warner, Sutton

TAX MAP/BLOCK/LOT/UNIT: N/A

US GEOLOGICAL SURVEY (USGS) TOPO MAP WATERBODY NAME:
☒ N/A

(Optional) LATITUDE/LONGITUDE in decimal degrees (to five decimal places): ° North
° West

SECTION 4 - APPLICANT (DESIRED PERMIT HOLDER) INFORMATION (Env-Wt 311.04(a))

If the applicant is a trust or a company, then complete with the trust or company information.

NAME: NH Department of Transportation		
MAILING ADDRESS: P.O. Box 483		
TOWN/CITY: Concord	STATE: NH	ZIP CODE: 03301
EMAIL ADDRESS:		
FAX:	PHONE:	

ELECTRONIC COMMUNICATION: By initialing here:  , I hereby authorize NHDES to communicate all matters relative to this application electronically.

SECTION 5 - AUTHORIZED AGENT INFORMATION (Env-Wt 311.04(c))

☐ N/A

LAST NAME, FIRST NAME, M.I.: Munro, David, A		
COMPANY NAME: Fuss & O'Neill		
MAILING ADDRESS: 50 Commercial St. Unit 2S		
TOWN/CITY: Manchester	STATE: NH	ZIP CODE: 03101
EMAIL ADDRESS: DMunro@fando.com		
FAX:	PHONE: (603) 222-3458	

ELECTRONIC COMMUNICATION: By initialing here DAM, I hereby authorize NHDES to communicate all matters relative to this application electronically.

SECTION 6 - PROPERTY OWNER INFORMATION (IF DIFFERENT THAN APPLICANT) (Env-Wt 311.04(b))

If the owner is a trust or a company, then complete with the trust or company information.

☒ Same as applicant

NAME:		
MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP CODE:
EMAIL ADDRESS:		
FAX:	PHONE:	

ELECTRONIC COMMUNICATION: By initialing here , I hereby authorize NHDES to communicate all matters relative to this application electronically.

SECTION 7 - RESOURCE-SPECIFIC CRITERIA ESTABLISHED IN Env-Wt 400, Env-Wt 500, Env-Wt 600, Env-Wt 700, OR Env-Wt 900 HAVE BEEN MET (Env-Wt 313.01(a)(3))

Describe how the resource-specific criteria have been met for each chapter listed above (please attach information about stream crossings, coastal resources, prime wetlands, or non-tidal wetlands and surface waters):
In accordance with Env-Wt 400, the jurisdictional areas within the project limits have been delineated by Cynthia Balcius (CWS) and Michael Waterhouse of Stoney Ridge Environmental, LLC in October through December 2021. The jurisdictional areas are referenced on the attached wetlands impact plans. The project has been designed in accordance with Env-Wt 527 and Env-Wt 900 to the maximum extent practicable. The application includes a supplemental narrative detailing the project purpose and need, resources, alternatives impacts and hydraulic information necessary to address Env-Wt 904.08. Unavoidable impacts to wetlands have been minimized to the maximum extent practicable. Project specific information is contained within this permit application.

SECTION 8 - AVOIDANCE AND MINIMIZATION

Impacts within wetland jurisdiction must be avoided to the maximum extent practicable (Env-Wt 313.03(a)).* Any project with unavoidable jurisdictional impacts must then be minimized as described in the Wetlands Best Management Practice Techniques For Avoidance and Minimization and the Wetlands Permitting: Avoidance, Minimization and Mitigation Fact Sheet. For minor or major projects, a functional assessment of all wetlands on the project site is required (Env-Wt 311.03(b)(10)).*

Please refer to the application checklist to ensure you have attached all documents related to avoidance and minimization, as well as functional assessment (where applicable). Use the Avoidance and Minimization Checklist, the Avoidance and Minimization Narrative, or your own avoidance and minimization narrative.

**See Env-Wt 311.03(b)(6) and Env-Wt 311.03(b)(10) for shoreline structure exemptions.*

SECTION 9 - MITIGATION REQUIREMENT (Env-Wt 311.02)

If unavoidable jurisdictional impacts require mitigation, a mitigation pre-application meeting must occur at least 30 days but not more than 90 days prior to submitting this Standard Dredge and Fill Permit Application.

Mitigation Pre-Application Meeting Date: Month: 12 Day: 21 Year: 2022

(☐ N/A - Mitigation is not required)

SECTION 10 - THE PROJECT MEETS COMPENSATORY MITIGATION REQUIREMENTS (Env-Wt 313.01(a)(1)c)

Confirm that you have submitted a compensatory mitigation proposal that meets the requirements of Env-Wt 800 for all permanent unavoidable impacts that will remain after avoidance and minimization techniques have been exercised to the maximum extent practicable: ☒ I confirm submittal.

(☐ N/A – Compensatory mitigation is not required)

SECTION 11 - IMPACT AREA (Env-Wt 311.04(g))

For each jurisdictional area that will be/has been impacted, provide square feet (SF) and, if applicable, linear feet (LF) of impact, and note whether the impact is after-the-fact (ATF; i.e., work was started or completed without a permit).

For intermittent and ephemeral streams, the linear footage of impact is measured along the thread of the channel. *Please note, installation of a stream crossing in an ephemeral stream may be undertaken without a permit per Rule Env-Wt 309.02(d), however other dredge or fill impacts should be included below.*

For perennial streams/rivers, the linear footage of impact is calculated by summing the lengths of disturbances to the channel and banks.

Permanent impacts are impacts that will remain after the project is complete (e.g., changes in grade or surface materials).

Temporary impacts are impacts not intended to remain (and will be restored to pre-construction conditions) after the project is completed.

JURISDICTIONAL AREA		PERMANENT			TEMPORARY		
		SF	LF	ATF	SF	LF	ATF
Wetlands	Forested Wetland	13,890		☐	378		☐
	Scrub-shrub Wetland	1,901		☐	1,772		☐
	Emergent Wetland	1,751		☐	5,280		☐
	Wet Meadow			☐			☐
	Vernal Pool			☐			☐
	Designated Prime Wetland			☐			☐
	Duly-established 100-foot Prime Wetland Buffer			☐			☐
Surface Water	Intermittent / Ephemeral Stream	2,012	389	☐			☐
	Perennial Stream or River			☐			☐
	Lake / Pond			☐			☐
	Docking - Lake / Pond			☐			☐
	Docking - River			☐			☐
Banks	Bank - Intermittent Stream			☐			☐
	Bank - Perennial Stream / River			☐			☐
	Bank / Shoreline - Lake / Pond			☐			☐
Tidal	Tidal Waters			☐			☐
	Tidal Marsh			☐			☐
	Sand Dune			☐			☐
	Undeveloped Tidal Buffer Zone (TBZ)			☐			☐
	Previously-developed TBZ			☐			☐
	Docking - Tidal Water			☐			☐
TOTAL		19,554	389		**7,430**		

SECTION 12 - APPLICATION FEE (RSA 482-A:3, I)

☐ **MINIMUM IMPACT FEE**: Flat fee of $400.

☐ **NON-ENFORCEMENT RELATED, PUBLICLY-FUNDED AND SUPERVISED RESTORATION PROJECTS, REGARDLESS OF IMPACT CLASSIFICATION:** Flat fee of $400 (refer to RSA 482-A:3, 1(c) for restrictions).

☒ **MINOR OR MAJOR IMPACT FEE:** Calculate using the table below:

Permanent and temporary (non-docking):	26,984 SF	× $0.40 =	$	10,794
Seasonal docking structure:	SF	× $2.00 =	$	
Permanent docking structure:	SF	× $4.00 =	$	
Projects proposing shoreline structures (including docks) add $400 =			$	
Total =			$	10,794

The application fee for minor or major impact is the above calculated total or $400, whichever is greater = $ 10,794

SECTION 13 - PROJECT CLASSIFICATION (Env-Wt 306.05)

Indicate the project classification.

☐ Minimum Impact Project	☐ Minor Project	☒ Major Project

SECTION 14 - REQUIRED CERTIFICATIONS (Env-Wt 311.11)

Initial each box below to certify:

Initials: DAM	To the best of the signer's knowledge and belief, all required notifications have been provided.
Initials: DAM	The information submitted on or with the application is true, complete, and not misleading to the best of the signer's knowledge and belief.
Initials: DAM	The signer understands that: • The submission of false, incomplete, or misleading information constitutes grounds for NHDES to: 1. Deny the application. 2. Revoke any approval that is granted based on the information. 3. If the signer is a certified wetland scientist, licensed surveyor, or professional engineer licensed to practice in New Hampshire, refer the matter to the joint board of licensure and certification established by RSA 310-A:1. • The signer is subject to the penalties specified in New Hampshire law for falsification in official matters, currently RSA 641. • The signature shall constitute authorization for the municipal conservation commission and the Department to inspect the site of the proposed project, except for minimum impact forestry SPN projects and minimum impact trail projects, where the signature shall authorize only the Department to inspect the site pursuant to RSA 482-A:6, II.
Initials: DAM	If the applicant is not the owner of the property, each property owner signature shall constitute certification by the signer that he or she is aware of the application being filed and does not object to the filing.

SECTION 15 - REQUIRED SIGNATURES (Env-Wt 311.04(d); Env-Wt 311.11)

SIGNATURE (OWNER):	PRINT NAME LEGIBLY: Ronald Grandmaison	DATE: 3/2/2023
SIGNATURE (APPLICANT, IF DIFFERENT FROM OWNER):	PRINT NAME LEGIBLY:	DATE:
SIGNATURE (AGENT, IF APPLICABLE): David Munro	PRINT NAME LEGIBLY: David Munro	DATE: 3/1/2023

SECTION 16 - TOWN / CITY CLERK SIGNATURE (Env-Wt 311.04(f))

As required by RSA 482-A:3, I(a)(1), I hereby certify that the applicant has filed four application forms, four detailed plans, and four USGS location maps with the town/city indicated below.

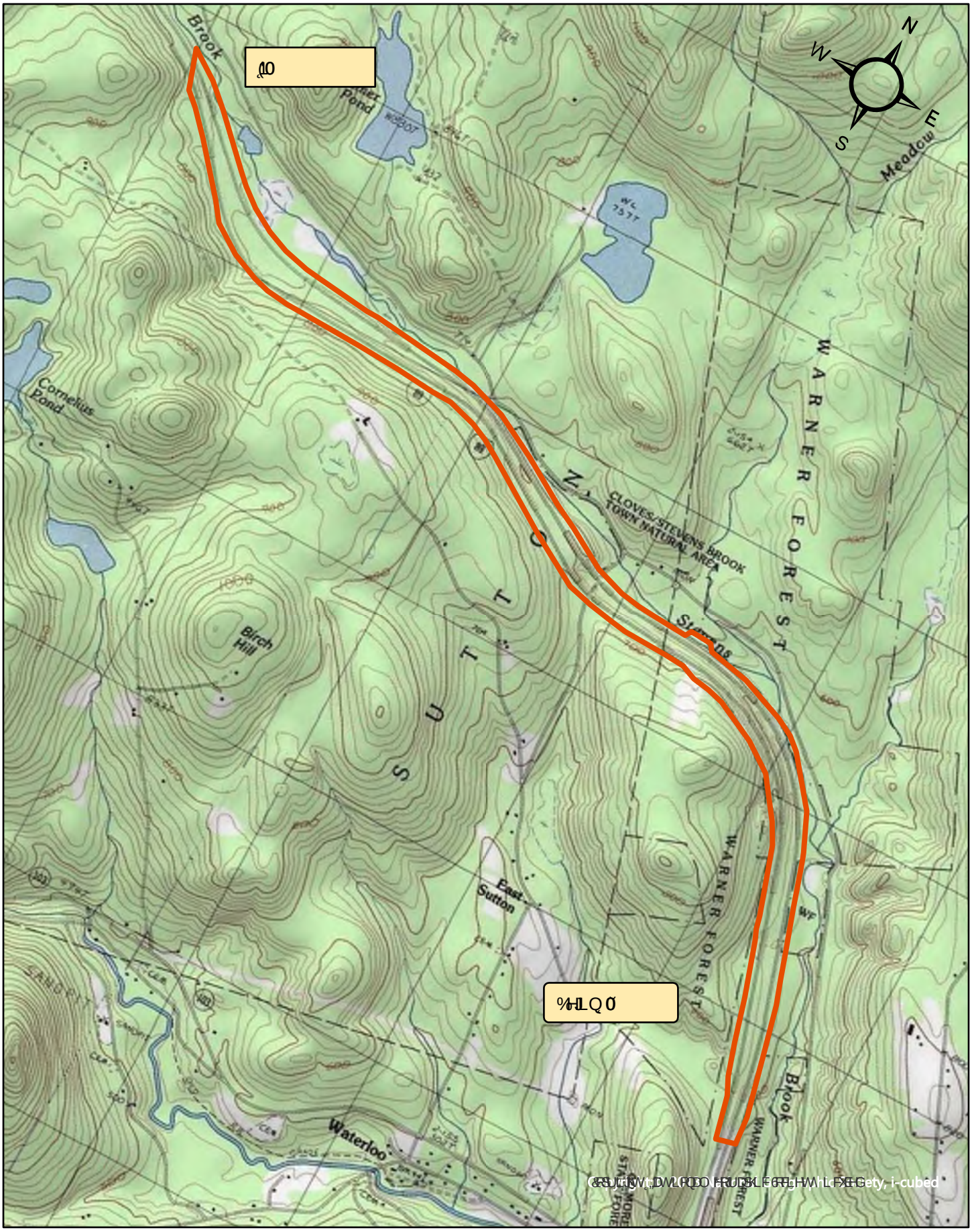
TOWN/CITY CLERK SIGNATURE:	PRINT NAME LEGIBLY: State Agency exempt per RSA 482-A:3, I(a)
TOWN/CITY: 4 copies certified mail	DATE:

DIRECTIONS FOR TOWN/CITY CLERK:
Per RSA 482-A:3, I(a)(1)

1. IMMEDIATELY sign the original application form and four copies in the signature space provided above.
2. Return the signed original application form and attachments to the applicant so that the applicant may submit the application form and attachments to NHDES by mail or hand delivery.
3. IMMEDIATELY distribute a copy of the application with one complete set of attachments to each of the following bodies: the municipal Conservation Commission, the local governing body (Board of Selectmen or Town/City Council), and the Planning Board.
4. Retain one copy of the application form and one complete set of attachments and make them reasonably accessible for public review.

DIRECTIONS FOR APPLICANT:
Submit the original permit application form bearing the signature of the Town/City Clerk, additional materials, and the application fee to NHDES by mail or hand delivery at the address at the bottom of this page. Make check or money order payable to “Treasurer – State of NH”.

DJQHU6XWWRQ



DOHV

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STANDARD DREDGE AND FILL WETLANDS PERMIT APPLICATION ATTACHMENT A: MINOR AND MAJOR PROJECTS

Water Division/Land Resources Management
Wetlands Bureau
Check the Status of your Application

RSA/ Rule: RSA 482-A/ Env-Wt 311.10; Env-Wt 313.01(a)(1); Env-Wt 313.03

APPLICANT'S NAME: **NH Department of Transportation** **TOWN NAME:** Warner-Sutton

Attachment A is required for *all minor and major projects*, and must be completed *in addition* to the Avoidance and Minimization Narrative or Checklist that is required by Env-Wt 307.11.

For projects involving construction or modification of non-tidal shoreline structures over areas of surface waters having an absence of wetland vegetation, only Sections I.X through I.XV are required to be completed.

PART I: AVOIDANCE AND MINIMIZATION

In accordance with Env-Wt 313.03(a), the Department shall not approve any alteration of any jurisdictional area unless the applicant demonstrates that the potential impacts to jurisdictional areas have been avoided to the maximum extent practicable and that any unavoidable impacts have been minimized, as described in the Wetlands Best Management Practice Techniques For Avoidance and Minimization.

SECTION I.I - ALTERNATIVES (Env-Wt 313.03(b)(1))

Describe how there is no practicable alternative that would have a less adverse impact on the area and environments under the Department's jurisdiction.

WITH THE EXCEPTION OF THE NON-BUILD ALTERNATIVE, WHICH WOULD NOT ADDRESS THE STRUCTURAL AND SAFETY DEFICIENCIES OF INTERSTATE 89 AND ITS APPURTENANCES, THE PROPOSED WORK IS THE ALTERNATIVE WITH THE LEAST IMPACT ON WETLANDS AND SURFACE WATERS. THE PROPOSED ROADWAY WORK IS LIMITED TO THE EXISTING FOOTPRINT BESIDES WHERE WIDENING IS NEEDED TO WIDEN THE EXISTING MEDIAN SHOULDERTO THE STANDARD INTERSTATE WIDTH. THE DRAINAGE WORK IS LIMITED TO EXISTING DRAINAGE SYSTEM STRUCTURES, ACCESS AND IMPACTS WERE MINIMIZED TO THE MAXIMUM EXTENT PRACTICABLE.

SECTION I.II - MARSHES (Env-Wt 313.03(b)(2))

Describe how the project avoids and minimizes impacts to tidal marshes and non-tidal marshes where documented to provide sources of nutrients for finfish, crustacean, shellfish, and wildlife of significant value.

This project does not impact tidal marshes or non-tidal marshes.

SECTION I.III - HYDROLOGIC CONNECTION (Env-Wt 313.03(b)(3))

Describe how the project maintains hydrologic connections between adjacent wetland or stream systems.

The proposed work will maintain existing connections between adjacent wetland or stream systems throughout the project area. Connections at drainage structures, included in the work, with perched outlets or sedimentation buildups at inlets or outlets will be rehabilitated or replaced in-kind as appropriate and will address deficiences in connectivity to the maximum extent practicable.

SECTION I.IV - JURISDICTIONAL IMPACTS (Env-Wt 313.03(b)(4))

Describe how the project avoids and minimizes impacts to wetlands and other areas of jurisdiction under RSA 482-A, especially those in which there are exemplary natural communities, vernal pools, protected species and habitat, documented fisheries, and habitat and reproduction areas for species of concern, or any combination thereof.

This project minimizes impacts to wetlands and streams by maintaining existing inlets, outlets, and connections between wetlands. Localized impacts will be required for upgrades to these structures, pipes, and outlets, which is necessary to extend the service life of the highway infrastructure and prevent catastrophic failure and emergency repair of the existing drainage system which would result in increased impacts to wetlands, as well as other environmental resources and the traveling public. Other wetland impacts due to tree clearing and slope work are necessary in order to complete these tasks that are intended to address existing safety concerns on the highway due to roadway widths. These efforts will align with meeting NHDOT standards established from the AASHTO Geometric Design of Highways and Streets.

There are no exemplary natural communities, vernal pools, protected species and habitat, documented fisheries, or habitat and reproduction areas for species of concern within the project limits.

SECTION I.V - PUBLIC COMMERCE, NAVIGATION, OR RECREATION (Env-Wt 313.03(b)(5))

Describe how the project avoids and minimizes impacts that eliminate, depreciate or obstruct public commerce, navigation, or recreation.

The proposed project will improve the condition of the highway drainage system and other roadway appurtenances on Interstate 89, therefore extending the functional lifespan of the highway and preserving the existing public commerce, navigation, and recreational opportunities.

SECTION I.VI - FLOODPLAIN WETLANDS (Env-Wt 313.03(b)(6))

Describe how the project avoids and minimizes impacts to floodplain wetlands that provide flood storage.

There are no existing floodplains or floodways with in the project area.

SECTION I.VII - RIVERINE FORESTED WETLAND SYSTEMS AND SCRUB-SHRUB – MARSH COMPLEXES (Env-Wt 313.03(b)(7))

Describe how the project avoids and minimizes impacts to natural riverine forested wetland systems and scrub-shrub – marsh complexes of high ecological integrity.

Impacts associated with riverine systems are limited to the maintenance and improvement of existing drainage structures. Any streams will be maintained in their existing locations and connectivity will be improved to the maximum extent possible where existing sedimentation, erosion or perched conditions exist.

The project will include impacts to scrub-shrub wetlands, however, no scrub-shrub marsh complexes are present within the project limits. The scrub-shrub wetlands that will be impacted are primarily located within previously disturbed man-made ditches adjacent to the highway and impacts to these areas are associated with slope work to accommodate roadway widening for safety purposes. All scrub-shrub wetlands that are disturbed for this reason will be reconstructed adjacent to the existing location and will continue to collect, convey, treat and control storm water and spring run-off in the same manner that the existing drainage ditches do currently.

Impacts to forested wetlands are due to work at drainage inlets and outlets.

All work will stabilize and extend the functional lifespan of many of these structures which are no longer structurally sound and will therefore decrease the potential for failure and resulting erosion and sedimentation of nearby water resources.

SECTION I.VIII - DRINKING WATER SUPPLY AND GROUNDWATER AQUIFER LEVELS (Env-Wt 313.03(b)(8))

Describe how the project avoids and minimizes impacts to wetlands that would be detrimental to adjacent drinking water supply and groundwater aquifer levels.

There are no drinking water wells or groundwater aquifers within the project area, and there are no anticipated impacts to the groundwater due to the nature of the work being that of maintenance and rehabilitation of existing highway infrastructure and appurtenances. Best Management Practices for erosion control and sedimentation will be installed and maintained throughout the duration of construction; there will be no impacts to water quality out of the work areas.

SECTION I.IX - STREAM CHANNELS (Env-Wt 313.03(b)(9))

Describe how the project avoids and minimizes adverse impacts to stream channels and the ability of such channels to handle runoff of waters.

Impacts are limited to intermittent streams and are necessary for the maintenance and improvement of existing drainage structures. The work will stabilize and extend the functional lifespan of many of these structures which are no longer structurally sound and will therefore descrease the potential for failure and resulting erosion and sedimentation of nearby water resources. Improvements include stone outlet protection to reduce the potential for scouring and to eliminate perches. Accumulated sediment and debris impeding flow at drainage culvert inlets and outlets will be removed, accomodating full flows.

SECTION I.X - SHORELINE STRUCTURES - CONSTRUCTION SURFACE AREA (Env-Wt 313.03(c)(1))

Describe how the project has been designed to use the minimum construction surface area over surface waters necessary to meet the stated purpose of the structures.

There are no shoreline structures proposed under this project.

SECTION I.XI - SHORELINE STRUCTURES - LEAST INTRUSIVE UPON PUBLIC TRUST (Env-Wt 313.03(c)(2))

Describe how the type of construction proposed is the least intrusive upon the public trust that will ensure safe docking on the frontage.

There are no shoreline structures proposed under this project.

SECTION I.XII - SHORELINE STRUCTURES – ABUTTING PROPERTIES (Env-Wt 313.03(c)(3))

Describe how the structures have been designed to avoid and minimize impacts on ability of abutting owners to use and enjoy their properties.

There are no shoreline structures proposed under this project.

SECTION I.XIII - SHORELINE STRUCTURES – COMMERCE AND RECREATION (Env-Wt 313.03(c)(4))

Describe how the structures have been designed to avoid and minimize impacts to the public's right to navigation, passage, and use of the resource for commerce and recreation.

There are no shoreline structures proposed under this project.

SECTION I.XIV - SHORELINE STRUCTURES – WATER QUALITY, AQUATIC VEGETATION, WILDLIFE AND FINFISH HABITAT (Env-Wt 313.03(c)(5))

Describe how the structures have been designed, located, and configured to avoid impacts to water quality, aquatic vegetation, and wildlife and finfish habitat.

There are no shoreline structures proposed under this project.

SECTION I.XV - SHORELINE STRUCTURES – VEGETATION REMOVAL, ACCESS POINTS, AND SHORELINE STABILITY (Env-Wt 313.03(c)(6))

Describe how the structures have been designed to avoid and minimize the removal of vegetation, the number of access points through wetlands or over the bank, and activities that may have an adverse effect on shoreline stability.

There are no shoreline structures proposed under this project.

PART II: FUNCTIONAL ASSESSMENT

REQUIREMENTS

Ensure that project meets the requirements of Env-Wt 311.10 regarding functional assessment (Env-Wt 311.04(j); Env-Wt 311.10).

FUNCTIONAL ASSESSMENT METHOD USED:

Function and value assessments representative of the various wetland types associated with the project area were completed using the Army Corps of Engineer's "Highway Methodology Workbook Supplement" (Appendix A, USACE, September 1999). Wetland classification types, in conjunction with soils and hydrological influences, were used to determine the groupings for the functions and values assessments, which are included in this application.

NAME OF CERTIFIED WETLAND SCIENTIST (FOR NON-TIDAL PROJECTS) OR QUALIFIED COASTAL PROFESSIONAL (FOR TIDAL PROJECTS) WHO COMPLETED THE ASSESSMENT: CYNTHIA BALCIUS

DATE OF ASSESSMENT: OCTOBER-DECEMBER 2021

Check this box to confirm that the application includes a NARRATIVE ON FUNCTIONAL ASSESSMENT:

☒

For minor or major projects requiring a standard permit without mitigation, the applicant shall submit a wetland evaluation report that includes completed checklists and information demonstrating the RELATIVE FUNCTIONS AND VALUES OF EACH WETLAND EVALUATED. Check this box to confirm that the application includes this information, if applicable:

☒

Note: The Wetlands Functional Assessment worksheet can be used to compile the information needed to meet functional assessment requirements.

AVOIDANCE AND MINIMIZATION CHECKLIST

Water Division/Land Resources Management
Wetlands Bureau

Check the Status of your Application

RSA/Rule: RSA 482-A/ Env-Wt 311.07(c)

This checklist can be used in lieu of the written narrative required by Env-Wt 311.07(a) to demonstrate compliance with requirements for Avoidance and Minimization (A/M), pursuant to RSA 482-A:1 and Env-Wt 311.07(c).

For the construction or modification of non-tidal shoreline structures over areas of surface waters without wetland vegetation, complete only Sections 1, 2, and 4 (or the applicable sections in Attachment A: Minor and Major Projects (NHDES-W-06-013).

The following definitions and abbreviations apply to this worksheet:

- "A/M BMPs" stands for Wetlands Best Management Practice Techniques for Avoidance and Minimization dated 2019, published by the New England Interstate Water Pollution Control Commission (Env-Wt 102.18).
- "Practicable" means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes (Env-Wt 103.62).

SECTION 1 - CONTACT/LOCATION INFORMATION	
APPLICANT LAST NAME, FIRST NAME, M.I.: NH Department of Transportation	
PROJECT STREET ADDRESS: Interstate 89, MM 20.5 to MM 24.2	PROJECT TOWN: Warner, Sutton
TAX MAP/LOT NUMBER: N/A	

SECTION 2 - PRIMARY PURPOSE OF THE PROJECT		
Env-Wt 311.07(b)(1)	Indicate whether the primary purpose of the project is to construct a water-access structure or requires access through wetlands to reach a buildable lot or the buildable portion thereof.	☐ Yes ☒ No

If you answered "no" to this question, describe the purpose of the "non-access" project type you have proposed:

The proposed project will rehabilitate roadway pavement and appurtenances along Interstate 89 from MM 20.5 to MM 24.2 in the towns of Warner and Sutton. The work will include reclaiming the mainline roadway pavement, inlaying bridges, replacing guardrail, repairing and replacing drainage features, clearing trees, scaling rock outcroppings, and repairing slopes.

SECTION 3 - A/M PROJECT DESIGN TECHNIQUES Check the appropriate boxes below in order to demonstrate that these items have been considered in the planning of the project. Use N/A (not applicable) for each technique that is not applicable to your project.		
Env-Wt 311.07(b)(2)	For any project that proposes new permanent impacts of more than one acre or that proposes new permanent impacts to a Priority Resource Area (PRA), or both, whether any other properties reasonably available to the applicant, whether already owned or controlled by the applicant or not, could be used to achieve the project's purpose without altering the functions and values of any jurisdictional area, in particular wetlands, streams, and PRAs.	☐ Check ☒ N/A
Env-Wt 311.07(b)(3)	Whether alternative designs or techniques, such as different layouts, construction sequencing, or alternative technologies could be used to avoid impacts to jurisdictional areas or their functions and values.	☒ Check ☐ N/A
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(1) Env-Wt 311.10(c)(2)	The results of the functional assessment required by Env-Wt 311.03(b)(10) were used to select the location and design for the proposed project that has the least impact to wetland functions.	☒ Check ☐ N/A
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(3)	Where impacts to wetland functions are unavoidable, the proposed impacts are limited to the wetlands with the least valuable functions on the site while avoiding and minimizing impacts to the wetlands with the highest and most valuable functions.	☒ Check ☐ N/A
Env-Wt 313.01(c)(1) Env-Wt 313.01(c)(2) Env-Wt 313.03(b)(1)	No practicable alternative would reduce adverse impact on the area and environments under the department's jurisdiction and the project will not cause random or unnecessary destruction of wetlands.	☒ Check ☐ N/A
Env-Wt 313.01(c)(3)	The project would not cause or contribute to the significant degradation of waters of the state or the loss of any PRAs.	☒ Check ☐ N/A
Env-Wt 313.03(b)(3) Env-Wt 904.07(c)(8)	The project maintains hydrologic connectivity between adjacent wetlands or stream systems.	☒ Check ☐ N/A
Env-Wt 311.10 A/M BMPs	Buildings and/or access are positioned away from high function wetlands or surface waters to avoid impact.	☒ Check ☐ N/A
Env-Wt 311.10 A/M BMPs	The project clusters structures to avoid wetland impacts.	☐ Check ☒ N/A
Env-Wt 311.10 A/M BMPs	The placement of roads and utility corridors avoids wetlands and their associated streams.	☐ Check ☒ N/A
A/M BMPs	The width of access roads or driveways is reduced to avoid and minimize impacts. Pullouts are incorporated in the design as needed.	☐ Check ☒ N/A
A/M BMPs	The project proposes bridges or spans instead of roads/driveways/trails with culverts.	☐ Check ☒ N/A

A/M BMPs	The project is designed to minimize the number and size of crossings, and crossings cross wetlands and/or streams at the narrowest point.	☐ Check ☒ N/A
Env-Wt 500 Env-Wt 600 Env-Wt 900	Wetland and stream crossings include features that accommodate aquatic organism and wildlife passage.	☒ Check ☐ N/A
Env-Wt 900	Stream crossings are sized to address hydraulic capacity and geomorphic compatibility.	☒ Check ☐ N/A
A/M BMPs	Disturbed areas are used for crossings wherever practicable, including existing roadways, paths, or trails upgraded with new culverts or bridges.	☐ Check ☒ N/A
SECTION 4 - NON-TIDAL SHORELINE STRUCTURES		
Env-Wt 313.03(c)(1)	The non-tidal shoreline structure has been designed to use the minimum construction surface area over surfaces waters necessary to meet the stated purpose of the structure.	☐ Check ☒ N/A
Env-Wt 313.03(c)(2)	The type of construction proposed for the non-tidal shoreline structure is the least intrusive upon the public trust that will ensure safe navigation and docking on the frontage.	☐ Check ☒ N/A
Env-Wt 313.03(c)(3)	The non-tidal shoreline structure has been designed to avoid and minimize impacts on the ability of abutting owners to use and enjoy their properties.	☐ Check ☒ N/A
Env-Wt 313.03(c)(4)	The non-tidal shoreline structure has been designed to avoid and minimize impacts to the public's right to navigation, passage, and use of the resource for commerce and recreation.	☐ Check ☒ N/A
Env-Wt 313.03(c)(5)	The non-tidal shoreline structure has been designed, located, and configured to avoid impacts to water quality, aquatic vegetation, and wildlife and finfish habitat.	☐ Check ☒ N/A
Env-Wt 313.03(c)(6)	The non-tidal shoreline structure has been designed to avoid and minimize the removal of vegetation, the number of access points through wetlands or over the bank, and activities that may have an adverse effect on shoreline stability.	☐ Check ☒ N/A

Warner-Sutton, #15747 (X-A000(942))
David Munro, Fuss & O'Neill, introduced the project including the location and description of the scope of work. Warner-Sutton is a 4R project which typically involves resurfacing, restoration, reconstruction, and rehabilitation of roadway infrastructure and appurtenances. The work will begin at MM 20.5 and extend 3.7 miles north to MM 24.2 on Interstate 89 (I-89) northbound and southbound for a total of 7.4 miles. The scope of work for this project includes full depth pavement reclaim on the I-89 mainline north and south barrels, median shoulder widening from 2.5' to 4' in select locations, guardrail replacement, tree clearing, rock scaling, minor bridge work (joint repair and paving only) and drainage improvements. The current advertising date is August 1, 2023, with the anticipated construction timeframe of Spring 2024 to Fall 2025. The primary purpose of this meeting is to review the anticipated impacts to natural resources, especially impacts to wetland areas under the jurisdiction of the NH Department of Environmental Services (NHDES), Wetlands Bureau (NH Wetlands Bureau) and the US Army Corps of Engineers (ACOE).

D. Munro provided an overview of the various wetland permitting anticipated for the proposed work. Much of the work will fall within the NHDES Certified Culvert Maintainer Program (CCMP) under Activities RR-1 (Culvert Replacement or Repair), RR-6 (Headwall Construction, Repair or Replacement) and RR-8 (Culvert Inlet and Outlet Maintenance). The remaining wetland impacts are covered under the NHDES Standard Dredge and Fill (SDF) and ACOE State Programmatic General Permit.

The wetland impacts can be grouped into three categories based on the type of work: roadway slope work; tree clearing and grubbing; and proposed drainage improvements.

- Roadway slope work
    - These impacts are attributed to the proposed shoulder widening as well as construction of two access roads necessary to perform drainage work at the bottom of steep slopes. These impacts are quantified as permanent wetland impacts, and are in areas of palustrine emergent, forested, and scrub-shrub wetlands.
- Tree clearing is necessary to provide construction access across the median, which will result in permanent impacts to forested and scrub-shrub wetlands.
- Drainage work which will result in wetland impacts can be further broken down into six categories:
    - Culvert lining utilizing Cured-In-Place-Pipe (CIPP)
        - Lining of five deteriorating metal culverts (three 30" dia. and two 24" dia.) is proposed. Additional work at these culverts will consist of headwall and end section repair or replacement and installation of outlet riprap protection utilizing Class B stone. Two of these locations will eliminate existing perches at the culvert outlets. One culvert conveys a Tier 1 intermittent stream crossing. Construction of stone outlet protection at these locations will result in permanent impacts to the Tier 1 stream and to palustrine forested, emergent, and scrub-shrub wetlands.
    - Perch repairs at Tier 1 stream crossings
        - In addition to the two perch locations noted above, there are four additional culverts at Tier 1 intermittent stream crossings with outlet perch conditions. The perch condition will be removed utilizing sloping Class B stone pads.

One perch height is 3.5’ (SB 1198+00) and will require a 50’ long pad at approximately 25% slope. The other locations have 1’ to 2’ perches which will be removed with pads ranging from 20’ to 40’ at 5% (max.) slope. The stone perch repairs will result in permanent impacts to the Tier 1 streams and to palustrine forested and scrub-shrub wetlands.

- Channel reconstruction
  - Approximately 65’ of outlet channel reconstruction is proposed at the outlet of the 24” RCP at SB 1216+75 RT. This work will include removal of a significant amount of built-up sediment to install a trapezoidal-shaped, Class B stone-lined channel approximately 65 feet in length to tie into the existing downstream channel. Construction of the stone-lined channel will result in permanent impacts to a palustrine forested wetland.
- Installation of beaver deterrent measures
  - The culvert at NB 1147+00 proposes beaver deterrent measures at the inlet and outlet to replace existing deterrent measures. Work at this culvert also includes replacing the inlet and outlet headwalls, and installation of inlet and outlet Class B stone pads. This is an intermittent Tier 1 stream crossing. Construction of the stone pads will result in permanent impacts to the Tier 1 stream and to a palustrine forested wetland.
- Underdrain/storm separation and underdrain outlet relocation
  - There are five locations impacting wetlands that propose replacing the existing combined storm/underdrain pipe with new separate storm and underdrain systems, along with their respective headwalls and Class B stone outlet protection. Installation of the stone outlet protection at these locations will result in permanent impacts to palustrine forested and scrub-shrub wetlands.
  - There are five additional locations with wetland impacts where underdrain outlet locations will be relocated to achieve adequate cover/depth. The impacts for this work include temporary impacts for removal of the existing pipe and permanent impacts for installation of the proposed pipe, headwall, and stone pad in a new location. These impacts are in palustrine forested, scrub-shrub, and emergent wetlands.
- Other non-CCMP work.
  - There are approximately 15 other wetland impact locations due to drainage-related work that does not fall into one of the above-mentioned categories. The wetland impacts for this work will be categorized as temporary impacts for in-place catch basin and underdrain replacement or permanent impacts for new headwalls or stone fill for regraded or re-aligned inlet or outlet channels.

D. Munro provided a summary of the anticipated wetland impacts for the project. The approximate permanent wetland impacts are estimated at 19,300 square feet (sf); with 3,600 sf from slope work, 600 sf from tree clearing and 15,100 sf from drainage work. The approximate temporary wetland impacts are estimated at 4,200 sf. Approximate permanent stream impacts are estimated at 255 linear feet (lf) for construction of culvert inlet or outlet stone protection at six culverts at intermittent Tier 1 stream crossings. The project is considered a major impact project with

permanent wetland impacts greater than 10,000 sf and permanent stream impacts greater than 200 lf. Mitigation utilizing an in-lieu fee to the ARM Fund is proposed. An approximate value of $163,670 was computed using the 2022 ARM Fund Calculator ($85,980 for wetland impacts and $77,690 for stream impacts).

D. Munro provided an overview of the other environmental resources and anticipated impacts or concerns. There are no anticipated NH Natural Heritage Bureau or NH Fish and Game impacts or concerns, however, the project is in the range of the Northern Long Eared Bat. Consultation with US Fish and Wildlife Service will be performed for the proposed tree clearing. The project is adjacent to several conservation lands; however, all work will be performed within the NHDOT Right-of-Way (ROW) and there is no anticipated impact to conservation land. There are no remediation or PFAS sites within 1,000 feet of the project limits. Limited Reuse Soils (LRS) will be managed under a Generic LRS Soil Management Plan (SMP). There will also be an Invasive Species Management Plan incorporated into this project to manage Type I and II species.

The impervious surface area will be increased by this project by 28,600 sf due to the proposed shoulder widening. To address Alteration of Terrain requirements, four grass treatment swales are proposed, which can collect and treat a combined 53,230 sf of impervious area (93% of the treatment goal of 57,200 sf: equal to two times the added impervious area). The Department's Water Quality Program Manager, Mark Hemmerlein, has reviewed and approved the proposed treatment plan.

Karl Benedict, NHDES Wetlands Bureau:

- Recommended adding wording into the contract to instruct the Contract Administrator (CA) to monitor the CCMP locations and include the progress in the quarterly reports.
- Expressed concern regarding the use of Class B stone at the perch repairs as that stone can become an additional obstacle for wildlife passage. He suggested the use of stream bed material as an alternative.
- In the application there should be wording that demonstrates cumulatively how impacts have been minimized and justified across the project. To better understand the impacts associated with tree clearing for access and with the slope work for the two construction access roads, he would like to see plans with contours shown. It is likely that some of the clearing areas can be considered temporary impacts and that various methods can be used to protect the wetlands. Joshua Brown added that timber matting could potentially be used at those locations.
- Requested confirmation that the stone pads at the beaver deterrent culvert are required.
- Requested additional information, including plans and details, for the following:
    1. stone perch repairs
    2. access roads and cleared median paths
    3. beaver deterrent culvert
    4. underdrain locations with wetland impacts

Michael Dionne, NH Fish and Game:

- Would also like to see additional information on the proposed stone perch repairs and stressed the importance that they are passable for wildlife.

Michael Hicks, Army Corps of Engineers:

- Requested additional investigation to determine the presence of small whorled pogonias.

Gary Croot, US Coast Guard:

- Confirmed that there are no navigable waterways on this project.

Jamie Sikora, FHWA:

- Appropriate documentation for the proposed tree clearing is required regarding the NLEB.

This project has not been previously discussed at the Monthly Natural Resource Agency Coordination Meeting.

Warner-Sutton; State No. 15747
Mitigation Report

The proposed project was discussed at the December 2022 Natural Resource Agency Coordination Meeting (NRACM). At the time of the meeting, it was anticipated that permanent impacts to delineated wetland areas would exceed 10,000 square feet and would require mitigation. This has been confirmed now that final impacts are determined. It was also anticipated that stream impacts would be more than the threshold of 200 linear feet of permanent impacts. This has also been confirmed, and the project will include mitigation relative to stream impacts.

The permanent impacts that require permitting under the Standard Dredge and Fill Permit are due to repairs required to maintain or rehabilitate the existing drainage infrastructure. The work is designed to minimize impacts to jurisdictional wetlands to the maximum extent practicable, as discussed in the wetland application documents. Proposed drainage work includes ultraviolet (UV) cured-in-place-pipe installation with associated outlet stone rip-rap protection; removal of sediment and debris accumulation and improvements to end treatments at culvert inlets and outlets; addressing perched outlets; installing beaver deterrent systems; and installation of new underdrain with associated stone outlet protection. There are additional impacts from tree clearing and grubbing required to access several drainage structures located in the median.

Finally, wetland impacts due to slope work associated with roadway widening, guardrail replacement and construction access roads that require fill in existing wetlands will also be permitted appropriately as permanent impacts and are included in the mitigation calculations.

As a result of the impacts associated with the activities described above, the Department is proposing to make a one time in-lieu wetland fee payment of $87,277.59 for 19,554 SF (Warner: 8,058 SF; Sutton: 11,496 SF) of permanent wetland impacts and $118,515.86 for 389 LF (Warner: 157 LF; Sutton 232 LF) of permanent stream impacts, to the NHDES Aquatic Resource Mitigation Fund.

Warner, NH Wetland

NHDES AQUATIC RESOURCE MITIGATION FUND
WETLAND PAYMENT CALCULATION
INSERT AMOUNTS IN YELLOW CELLS

1	**Convert square feet of impact to acres:**		
INSERT SQ FT OF	Square feet of impact	8058.00	
		43560.00	
	Acres of impact =	0.1850	
2	**Determine acreage of wetland construction:**		
	Forested wetlands:	0.2775	
	Tidal wetlands:	0.5550	
	All other areas:	0.2775	
3	**Wetland construction cost:**		
	Forested wetlands:	$28,428.99	
	Tidal Wetlands:	$56,857.98	
	All other areas:	$28,428.99	
4	**Land acquisition cost (See land value table):**		
INSERT LAND VALUE FROM TABLE WHICH APPEARS TO THE LEFT. (Insert the amount do not copy and paste)	Town land value:	3312	
	Forested wetlands:	$919.01	
	Tidal wetlands:	$1,838.02	
	All other areas:	$919.01	
5	**Construction + land costs:**		
	Forested wetland:	$29,348.00	
	Tidal wetlands:	$58,696.00	
	All other areas:	$29,348.00	
6	**NHDES Administrative cost:**		
	Forested wetlands:	$5,869.60	
	Tidal wetlands:	$11,739.20	
	All other areas:	$5,869.60	
----------	**TOTAL ARM PAYMENT**********		
	Forested wetlands:	$35,217.60	
	Tidal wetlands:	$70,435.20	
	All other areas:	$35,217.60	

Warner, NH Stream

NHDES AQUATIC RESOURCE MITIGATION FUND STREAM PAYMENT CALCULATION		
INSERT LINEAR FEET OF IMPACT on BOTH BANKS AND CHANNEL	Right Bank	
	Left Bank	
	Channel	157.0000
	TOTAL IMPACT	157.0000
	Stream Impact Cost:	$39,860.73
	NHDES Administrative cost:	
		$7,972.15
*********	TOTAL ARM FUND STREAM PAYMENT********	
		$47,832.88

Sutton, NH Stream

NHDES AQUATIC RESOURCE MITIGATION FUND STREAM PAYMENT CALCULATION		
INSERT LINEAR FEET OF IMPACT on BOTH BANKS AND CHANNEL	Right Bank	0.00
	Left Bank	
	Channel	232.0000
	TOTAL IMPACT	232.0000
	Stream Impact Cost:	$58,902.48
	NHDES Administrative cost:	
		$11,780.50
*********	TOTAL ARM FUND STREAM PAYMENT********	
		$70,682.98

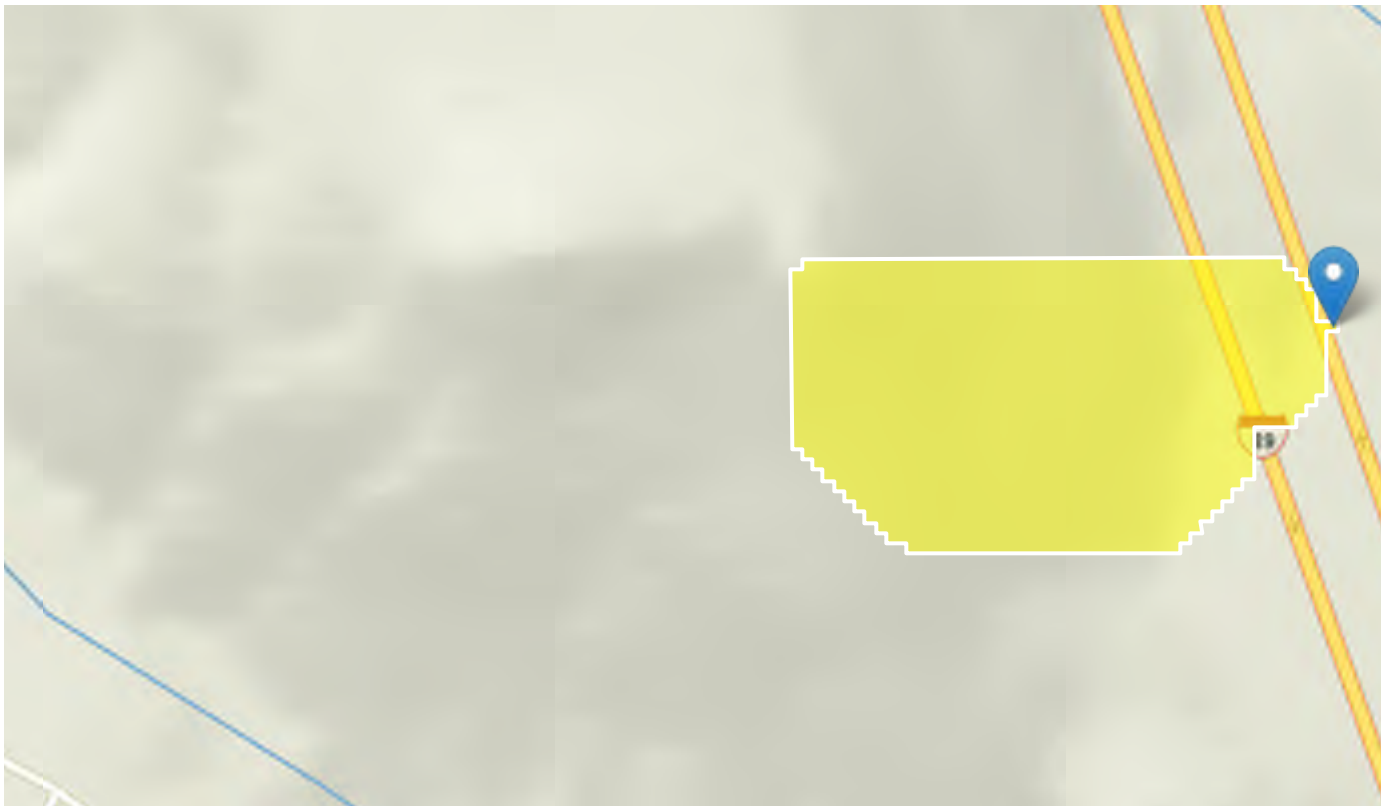
Sutton, NH Wetland

NHDES AQUATIC RESOURCE MITIGATION FUND
WETLAND PAYMENT CALCULATION
INSERT AMOUNTS IN YELLOW CELLS

1	**Convert square feet of impact to acres:**		
INSERT SQ FT OF	Square feet of impact	11496.00	
		43560.00	
	Acres of impact =	0.2639	
2	**Determine acreage of wetland construction:**		
	Forested wetlands:	0.3959	
	Tidal wetlands:	0.7917	
	All other areas:	0.3959	
3	**Wetland construction cost:**		
	Forested wetlands:	$40,558.41	
	Tidal Wetlands:	$81,116.82	
	All other areas:	$40,558.41	
4	**Land acquisition cost (See land value table):**		
INSERT LAND VALUE FROM TABLE WHICH APPEARS TO THE LEFT. (Insert the amount do not copy and paste)	Town land value:	7136	
	Forested wetlands:	$2,824.91	
	Tidal wetlands:	$5,649.82	
	All other areas:	$2,824.91	
5	**Construction + land costs:**		
	Forested wetland:	$43,383.32	
	Tidal wetlands:	$86,766.65	
	All other areas:	$43,383.32	
6	**NHDES Administrative cost:**		
	Forested wetlands:	$8,676.66	
	Tidal wetlands:	$17,353.33	
	All other areas:	$8,676.66	
----------	**TOTAL ARM PAYMENT**----------		
	Forested wetlands:	$52,059.99	
	Tidal wetlands:	$104,119.98	
	All other areas:	$52,059.99	

Warner-Sutton 15747 1147+00 DN 5N

Region ID: NH
Workspace ID: NH20220725143034719000
Clicked Point (Latitude, Longitude): 43.30501, -71.84224
Time: 2022-07-25 10:30:54 -0400



I-89 NB 1147+00 ---- 0.04 sq. miles = 25.6 acres = Tier 1

Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
APRAVPRE	Mean April Precipitation	3.839	inches
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	658	feet per mi

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.04	square miles
WETLAND	Percentage of Wetlands	0	percent

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Flow Statewide SIR2008 5206]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.04	square miles	0.7	1290
APRAVPRE	Mean April Precipitation	3.839	inches	2.79	6.23
WETLAND	Percent Wetlands	0	percent	0	21.8
CSL10_85	Stream Slope 10 and 85 Method	658	feet per mi	5.43	543

Peak-Flow Statistics Disclaimers [Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit
50-percent AEP flood	3.39	ft^3/s
20-percent AEP flood	6.54	ft^3/s
10-percent AEP flood	9.5	ft^3/s
4-percent AEP flood	13.9	ft^3/s
2-percent AEP flood	17.9	ft^3/s
1-percent AEP flood	22.7	ft^3/s
0.2-percent AEP flood	35.6	ft^3/s

Peak-Flow Statistics Citations

Olson, S.A.,2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

Application Version: 4.10.1
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

NH Department of Transportation
Bureau of Highway Design
Fuss & O'Neill
Env-Wt 904.08 Repair, Rehabilitation, or Replacement of Tier 1 or Tier 2 Crossings
Stream Crossing Form
Prepared by: D. Munro, P.E.

Env-Wt 904.08(a)- The repair, rehabilitation, or replacement of a Tier 1 or Tier 2 stream crossing shall be limited to stream crossings where the contributing watershed is as specified for the tier and the certification specified in (b) is provided.

Crossing's Drainage Area: 0.03 square miles, (20.5 acres)

Project Description The Warner-Sutton 15747 project is located along I-89 NB and SB from approximately MM 20.5 to MM 24.2. The purpose of this project is to rehabilitate the existing pavement, replace or rehabilitate aged drainage and guardrail, and improve safety.

The location for this crossing is near NB MM 22.2, Station 1199+75, (Sheet 15; Drainage note 15N) and is a 24" cmp in the existing condition.

Env-Wt 904.08(b)- A project to repair, rehabilitate, or replace a tier 1 or tier 2 crossing shall qualify under this section only if a professional engineer certifies that:

(1) The existing crossing does not have a history of causing or contributing to flooding that damages the crossing or other human infrastructure or protected species habitat;
The crossing does not have a history of causing or contributing to flooding that damages the crossing or other human infrastructure or protected species habitat.

(2) The proposed stream crossing will:

a. Meet the general criteria specified in Env-Wt 904.01;
see page 2 for Env-Wt 904.01 form

b. Maintain or enhance the hydraulic capacity of the stream crossing;
The proposed work will maintain the hydraulic capacity of the stream crossing.

c. Maintain or enhance the capacity of the crossing to accommodate aquatic organism passage;
The proposed work will maintain the capacity of the crossing to accommodate aquatic organism passage.

d. Maintain or enhance the connectivity of the stream reaches upstream or downstream of the crossing; and
The proposed work maintains the connectivity of the stream reaches upstream or downstream of the crossing.

e. Not cause or contribute to the increase in the frequency of flooding or overtopping of the banks upstream or downstream of the crossing.
The proposed work will not cause an increase in the frequency of flooding or overtopping of the banks upstream or downstream of the crossing. The crossing does not have a history of overtopping its banks.

Env-Wt 904.08(c)- Rehabilitation of a culvert or other closed-bottom stream crossing structure pursuant to this section may be accomplished by concrete repair, slip lining, cured-in-place lining, or concrete invert lining, or any combination thereof, except that slip lining shall not occur more than once. *(if applicable, indicate the type of rehabilitation)*

The 24" corrugated metal pipe (CMP) is proposed to be rehabilitated by ultra-violet (UV) cured-in-place-pipe (CIPP) installation which will result in very similar hydraulic characteristics. Once cured, the thickness of the CIPP liner is roughly only a quarter inch thickness around the inside perimeter of the existing pipe. Additional work includes replacing the existing inlet headwall with a new headwall with wingwalls to accommodate an adjacent underdrain outfall; reconstructing 15' of inlet channel with new stone protection to direct the inlet channel into the pipe and prevent future erosion around the headwall or wingwalls; elimination of an approx. 2' perch at the outlet by removing the last 8' of pipe and the installation of a sloping stone apron utilizing Class B stone. A new concrete headwall will be installed at the outlet to protect the outlet pipe and conform to the grading necessary for removal of the last section of pipe.

Env-Wt 904.01 General Design Considerations
Applicable to All Stream Crossings

The crossing meets or exceeds the general design criteria specified in Env-Wt 904.01, as follows:

(a) All stream crossings, whether over tidal or non-tidal waters, shall be designed and constructed so as to:

(1) Not be a barrier to sediment transport;
The proposed work will not alter the stream crossing's sediment transport competence.

(2) Not restrict high flows and maintain existing low flows;
The proposed work will not alter the stream crossing's ability to maintain high and low flows. Streamstats reports a 2-year flow of 2.39 cfs, and a 50-year peak flow of 12.9 cfs for the existing and proposed conditions.

(3) Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction;
The proposed work will not alter the stream crossing's ability to accommodate the movement of indigenous life beyond the duration of construction.

(4) Not cause an increase in the frequency of flooding or overtopping of banks;
The proposed work will not cause an increase in the frequency of flooding or overtopping of banks.

(5) Maintain or enhance geomorphic compatibility by:
a. Minimizing the potential for inlet obstruction by sediment, wood, or debris; and
The proposed work will not increase the potential for inlet obstruction by sediment, wood, or debris.
b. Preserving the natural alignment of the stream channel;
The proposed project does not change the alignment of the stream channel.

(6) Preserve watercourse connectivity where it currently exists;
The proposed work will preserve the existing watercourse connectivity.

(7) Restore watercourse connectivity where:
a. Connectivity previously was disrupted as a result of human activity(ies); and
The proposed work will not alter the existing watercourse connectivity.

b. Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both;
The proposed work will not alter the existing watercourse connectivity.

(8) Not cause erosion, aggradation, or scouring upstream or downstream of the crossing; and
The use of erosion control measures during construction, and the stabilization of disturbed areas, will ensure that there is no erosion, aggradation, or scour because of the proposed work.

(9) Not cause water quality degradation
The proposed work will extend the functionality of the existing drainage system and maintain current water quality levels.

(b) For stream crossing over tidal waters, the stream crossing shall be designed to:
(1) Match the velocity, depth, cross-sectional area, and substrate of the natural stream: and
This project does not impact tidal waters.
(2) Be of sufficient size to not restrict bi-directional tidal flow over the natural tide range above, below, and through the crossing.
This project does not impact tidal waters.

Stream Crossing Assessments
NHDOT Road Rehabilitation and Drainage Improvement Project

Warner-Sutton, New Hampshire

NHDOT# 15747

Prepared for:

NH Department of Transportation
7 Hazen Drive
Concord, NH 03302

Prepared by:

FB Environmental Associates
383 Central Ave, Suite 267
Dover, NH 03820

January 2023

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List of Figures

Summary

At the request of the New Hampshire Department of Transportation (NHDOT), FB Environmental (FBE) conducted stream crossing assessments within an approximately 30-acre Survey Area along a cumulative 0.3-mile stretch of Interstate-89 in Warner and Sutton, New Hampshire. The Survey Area includes two areas: one located at the Warner/Sutton town line and the other approximately 1.5-miles northwest along the interstate. FBE conducted stream crossing assessments at five (5) locations identified by NHDOT. To maintain consistency when referencing assessment locations, FBE utilized NHDOT's naming convention: Crossing 4 NB 1199+75; Crossing 4 SB 1198+00; Crossing 5 SB 1282+60; Crossing 6 NB 1290+00; and Crossing 6 SB 1287+40.

1. Introduction

FBE was contracted by the New Hampshire Department of Transportation (NHDOT) to conduct stream crossing assessments at a project area in Warner and Sutton, New Hampshire in support of a road reconstruction and drainage improvement project. The Survey Area is broken up into two areas; one area is located at the Warner/Sutton town line and the other is located 1.5 miles northwest along the interstate (Figure 1). Wetlands and streams within the Survey Area were previously delineated by a separate company.

2. Methods

2.1 Stream Crossing Assessment

FBE conducts stream crossing assessments in accordance with the New Hampshire Department of Environmental Services (NHDES) wetland rules effective December 2019 (Env-Wt 100-900, specifically Env-Wt 903.04(j) and 903.05(a)). Physical data collection includes bankfull width, bankfull depth, and flood-prone width measurements at three cross sectional areas within a reference reach segment of a stream. FBE also records substrate particle size and distribution throughout the examined reach.

2.2 Global Positioning System (GPS) Data Collection

FBE geo-located reference points using a mapping-grade GPS unit (Eos Arrow 100), in accordance with the manufacturer's data collection standards designed to achieve sub-meter accuracy. (Note that sub-meter accuracy is attained only in ideal conditions, which are seldom present in the field.) All data are exported as an ESRI shapefile in the coordinate system New Hampshire State Plane, Zone 4676 (FIPS 2800), NAD83, Survey Feet.

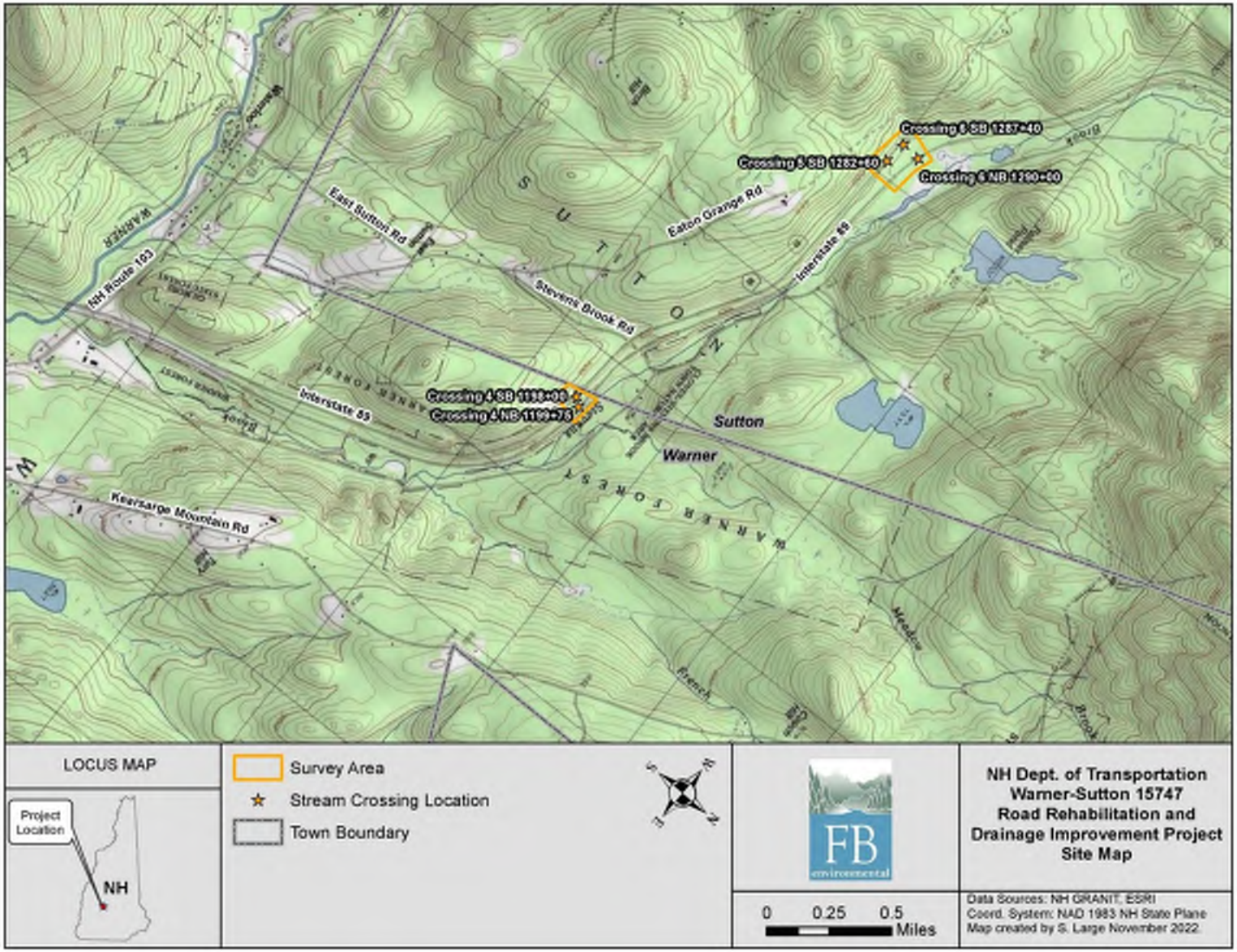

Figure 1. Project Survey Area along Interstate-89 in Warner and Sutton, New Hampshire.

3. Results

3.1 Fieldwork

FBE Wetland Scientist Sarah Large and Project Scientists Jordan Foulds and Elliott Boardman conducted the stream crossing assessment fieldwork on 27 and 28 October 2022. FBE conducted five (5) stream crossing assessments at locations identified by NHDOT: Crossing 4 NB 1199+75; Crossing 4 SB 1198+00; Crossing 5 SB 1282+60; Crossing 6 NB 1290+00; and Crossing 6 SB 1287+40. The watercourses generally flow from the south side of Interstate-89 north under the interstate and drain directly to Stevens Brook or to wetlands associated with the brook. The results of the stream assessments are described below.

3.2 Stream Crossings

FBE completed New Hampshire Department of Environmental Services Stream Crossing Assessment Worksheets for each of the five crossing locations. FBE utilized the NHDES Wetland Permit Planning Tool (WPPT) to calculate each of the crossing's drainage areas since the watercourses were not available on USGS's StreamStats tool. The slope of the crossings was not surveyable. Therefore, the slope data are not included on the NHDES Stream Crossing Worksheets.

Crossing 4 SB 1198+00

Crossing 4 SB 1198+00 is located along the south bound barrel of Interstate-89 just east of the Warner/Sutton town line. The watercourse originates outside of the Survey Area and flows north under the interstate through an approximately 124-foot long 24" reinforced concrete pipe (RCP). At the time of the survey, water depth within the stream ranged from 0.1 to 0.3 feet. The outlet of the crossing is perched and the distance from the invert of the RCP to the water's surface was 1.6 feet. The watercourse then flows over a series of cascades down a very steep slope (~28%). The average bankfull width of the watercourse upstream and downstream of the crossing is approximately 4 feet.

The stream crossing assessment for Crossing 4 SB 1198+00 was conducted approximately 209 feet upstream of the crossing within an uninfluenced, forested reach of the stream. The watercourse is a headwater stream with a steep gradient. Stream substrate consists of cobbles, sand, and muck. The average bankfull width within the reference reach is 5.4 feet. Based on the assessment, the reference reach of Crossing 4 SB 1198+00 meets the Type B Rosgen stream classification. The entrenchment ratio range for a type B stream is 1.41 to 2.2. Per the stream crossing guidelines and NHDES stream crossing rules, the recommended span for a compliant replacement structure at Crossing 4 SB 1198+00 ranges from 7.6 to 11.9 feet.

Crossing 4 SB 1198+00's drainage area is approximately 20.2 acres, which meets the criteria for a Tier 1 stream crossing.

Crossing 4 NB 1199+75

Crossing 4 NB 1199+75 is located along the north bound barrel of Interstate-89 just east of the Warner/Sutton town line and north of Crossing 4 SB 1198+00. Crossing 4 SB 1198+00 and Crossing 4 NB 1199+75 carry the same unnamed stream under the interstate. The watercourse originates outside of the Survey Area and flows north under the southbound barrel of the interstate through Crossing 4 SB 1198+00, daylights for approximately 135

feet in the median of the highway, and then crosses again under the north bound barrel through an approximately 150-foot long 24" RCP at Crossing 4 NB 1199+75. At the time of the survey, the water depth within the stream upstream of the crossing was very shallow and completely dry in areas. At the outlet, the culvert is perched, and a large scour pool has formed. The distance from the invert of the RCP to the water's surface was 1.4 feet. The pool is 6.8 feet wide and 10-feet long and had a maximum water depth of 0.9 feet during the survey. The average bankfull width of the watercourse upstream and downstream of the crossing is approximately 6.3 feet.

The stream crossing assessment for Crossing 4 NB 1199+75 was conducted upstream of the crossing's inlet within the segment of stream flowing between the northbound and southbound barrels of the interstate. The watercourse has a steep gradient and a substrate of boulders, cobbles, gravel, and sand; boulders being the dominant substrate. The average bankfull width within the reference reach is 4.8 feet. Based on the assessment, the reference reach of Crossing 4 NB 1199+75 meets the Type B Rosgen stream classification. The entrenchment ratio range for a type B stream is 1.41 to 2.2. Per the stream crossing guidelines and NHDES stream crossing rules, the recommended span for a compliant replacement structure at Crossing 4 NB 1199+75 ranges from 6.8 to 10.6 feet.

Crossing 4 NB 1199+75's drainage area is approximately 20.5 acres, which meets the criteria for a Tier 1 stream crossing.

Crossing 5 SB 1282+60

Crossing 5 SB 1282+60 is located along the south bound barrel of Interstate-89 approximately 1.5-miles from the Warner/Sutton town line. The watercourse originates outside of the Survey Area and flows north under I-89 through an approximately 100-foot-long 30" RCP. Water depth within the stream channel ranged from 0.1 to 0.3 feet. The outlet of the crossing is perched by 2 feet. A scour pool 3.7-feet wide x 9.6-feet long has also formed downstream of the crossing. The average bankfull width of the watercourse upstream and downstream of the crossing is approximately 4.3 feet.

The stream crossing assessment for Crossing 5 SB 1282+60 was conducted approximately 144 feet upstream of the crossing within an uninfluenced, forested reach of the stream. The watercourse is a headwater stream on a very steep slope with a substrate consisting of sand, gravel, and boulders. The average bankfull width within the reference reach is 3.7 feet. Based on the assessment, the reference reach of Crossing 5 SB 1282+60 meets the Type B Rosgen stream classification. The entrenchment ratio range for a type B stream is 1.41 to 2.2. Per the stream crossing guidelines and NHDES stream crossing rules, the recommended span for a compliant replacement structure at Crossing 5 SB 1282+60 ranges from 5.2 to 8.1 feet.

Crossing 5 SB 1282+60's drainage area is approximately 55.7 acres, which meets the criteria for a Tier 1 stream crossing.

Crossing 6 SB 1287+40

Crossing 6 SB 1287+40 is located along the south bound barrel of the interstate, approximately 1.6-miles west of the Warner/Sutton town line. The watercourse originates outside of the Survey Area south of I-89 and flows north under the interstate through an approximately 143-foot long 36" RCP. At the time of the survey water depth within the stream ranged from 0.2 to 0.5 feet. The outlet of the crossing is perched by 1.6 feet which has created a scour pool measuring 10 feet wide by 28 feet long. The average bankfull width of the watercourse upstream and downstream of the crossing is approximately 5.3 feet.

The stream crossing assessment for Crossing 6 SB 1287+40 was conducted approximately 146 feet upstream of the crossing within an uninfluenced, forested reach of the stream. The watercourse is a headwater stream on a steep slope with a substrate consisting of sand and gravel. The average bankfull width within the reference reach is 5.6 feet. Based on the assessment, the reference reach of Crossing 6 SB 1287+40 meets the Type B Rosgen stream classification. The entrenchment ratio range for a type B stream is 1.41 to 2.2. Per the stream crossing guidelines and NHDES stream crossing rules, the recommended span for a compliant replacement structure at Crossing 6 SB 1287+40 meets ranges from 7.9 to 12.3 feet.

Crossing 6 SB 1287+40's drainage area is approximately 66 acres, which meets the criteria for a Tier 1 stream crossing.

Crossing 6 NB 1290+00

Crossing 6 NB 1290+00 is located along the north bound barrel of I-89 approximately 1.6-miles west of the Warner/Sutton town line and north of Crossing 6 SB 1287+40. Crossing 6 SB 1287+40 and Crossing 6 NB 1290+00 carry the same unnamed stream under the interstate. The watercourse originates outside of the Survey Area and flows north under the southbound barrel of the interstate, daylights for approximately 470-feet in the median of the highway and then crosses again under the north bound barrel of I-89 through an approximately 112-foot long 36" RCP at Crossing 6 NB 1290+00. The water depth within the stream channel ranged from 0.3 to 0.9 feet. The outlet of the crossing is perched by 1.1 feet and a deep (3.7 feet) scour pool 10-feet wide x 28-feet long has formed downstream of the crossing. The average bankfull width of the watercourse upstream and downstream of the crossing is approximately 5.1 feet.

The stream crossing assessment for Crossing 6 NB 1290+00 was conducted approximately 255 feet upstream of the crossing's inlet within the segment of stream flowing between the northbound and southbound barrels of the interstate. Stream substrate consists of sand, gravel, and cobbles with sand being the dominant substrate. The average bankfull width within the reference reach is 6.2 feet. Based on the assessment, the reference reach of Crossing 6 NB 1290+00 meets the Type E Rosgen stream classification. The entrenchment ratio for a Type E stream is 2.2. Per the stream crossing guidelines and NHDES stream crossing rules, the recommended span for a compliant replacement structure at Crossing 6 NB 1290+00 is 13.7 feet.

Crossing 6 NB 1290+00 drainage area is approximately 80 acres, which meets the criteria for a Tier 1 stream crossing.

References

Department of Environmental Services. 2019. *New Hampshire Code of Administrative Rules.* Retrieved from: http://des.nh.gov/organization/commissioner/legal/rules/documents/env-wt100.pdf

New Hampshire Fish and Game Department. 2009. New Hampshire Stream Crossing Guidelines. https://www.nae.usace.army.mil/Portals/74/docs/regulatory/StreamRiverContinuity/nh_stream_crossing_guidelines_unh_web_rev_2.pdf

APPENDIX A. Photographs

Photo 1. The outlet of Crossing 4 SB 1198+00 is perched.

Photo 2. The downstream reach from the outlet of Crossing 4 SB 1198+00 is very steep (~28%) and is strewn with boulders.

Photo 3. The watercourse takes a sharp bend to enter the inlet of Crossing 4 SB 1198+00.

Photo 4. The view facing downstream along the watercourse towards the inlet of Crossing 4 SB 1198+00.

Photo 5. The streambed substrate upstream of Crossing 4 SB 1198+00 is a mix of gravel, cobble, and boulders.

Photo 6. Reference reach cross section location #1 for Crossing 4 SB 1198+00.

Photo 7. Reference reach cross section location #2 for Crossing 4 SB 1198+00.

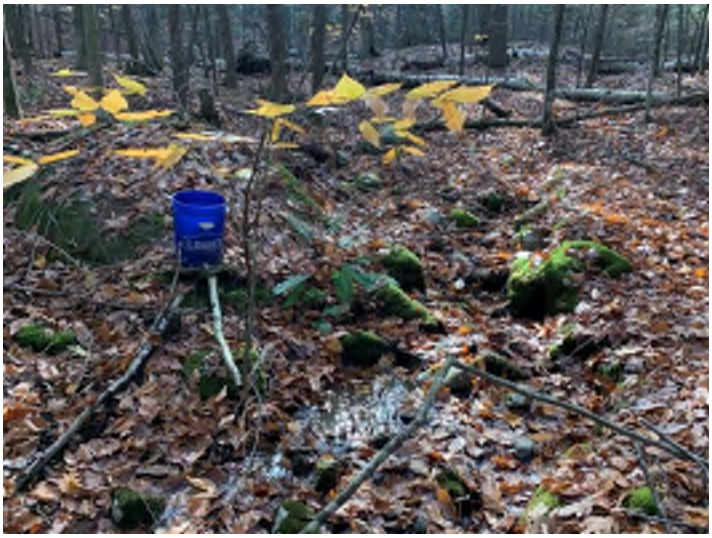

Photo 8. Reference reach cross section location #3 for Crossing 4 SB 1198+00.

Photo 9. A scour pool is located at the perched outlet of Crossing 4 NB 1199+75.

Photo 10. The watercourse carried by Crossing 4 NB 1199+75 free falls over a steep bank and discharges to Stevens Brook.

Photo 11. The inlet of Crossing 4 NB 1199+75 was obstructed by leaf litter and other organic debris.

Photo 12. The upstream reach from the inlet of Crossing 4 NB 1199+75 is very steep and strewn with boulders.

Photo 13. Reference reach cross section location #1 for Crossing 4 NB 1199+75.

Photo 14. Reference reach cross section location #2 for Crossing 4 NB 1199+75.

Photo 15. Reference reach cross section location #3 for Crossing 4 NB 1199+75.

Photo 16. The outlet of Crossing 5 SB 1282+60 is perched by 2 feet. A scour pool has also formed downstream of the outlet.

Photo 17. A representative view of the stream conditions downstream of Crossing 5 SB 1282+60.

Photo 18. The watercourse takes a sharp turn into the inlet of Crossing 5 SB 1282+60. The inlet is overgrown with shrubs, making it challenging to get an unobstructed view.

Photo 19. Reference reach cross section location #1 for Crossing 5 SB 1282+60.

Photo 20. Reference reach cross section location #2 for Crossing 5 SB 1282+60.

Photo 21. Reference reach cross section location #3 for Crossing 5 SB 1282+60.

Photo 22. The outlet of Crossing 6 SB 1287+40 is perched, and a large scour pool has formed downstream of the outlet.

Photo 23. A view of the downstream conditions taken from above the outlet of Crossing 6 SB 1287+40.

Photo 24. An image of the inlet at Crossing 6 SB 1287+40.

Photo 25. Reference reach cross section location #1 for Crossing 6 SB 1287+40.

Photo 26. Reference reach cross section location #2 for Crossing 6 SB 1287+40.

Photo 27. Reference reach cross section location #3 for Crossing 6 SB 1287+40.

Photo 28. A natural cobble bar/weir within the scour pool at the outlet of Crossing 6 NB 1290+00.

Photo 29. A view of the downstream conditions taken from above the outlet of Crossing 6 NB 1290+00.

Photo 30. The inlet at Crossing 6 NB 1290+00. The culvert is a 36" reinforced concrete pipe.

Photo 31. The stream flows through a narrow channel surrounded by emergent and scrub-shrub vegetation upstream of Crossing 6 NB 1290+00.

Photo 32. Reference reach cross section location #1 for Crossing 6 NB 1290+00.

Photo 33. Reference reach cross section location #2 for Crossing 6 NB 1290+00.

Photo 34. Reference reach cross section location #3 for Crossing 6 NB 1290+00.

APPENDIX B. Completed Stream Crossing Assessment Worksheets

NHDES-W-06-071

WETLANDS PERMIT APPLICATION
STREAM CROSSING WORKSHEET
Water Division/Land Resources Management
Wetlands Bureau

RSA/Rule RSA 482-A/ Env-Wt-900

This worksheet can be used to accompany Wetlands Permit Applications when proposing stream crossings.

SECTION 1 - TIER CLASSIFICATIONS

Determine the contributing watershed size at USGS StreamStats.

Note: Plans for tier 2 and 3 crossings shall be designed and stamped by a professional engineer who is licensed under RSA 310-A to practice in New Hampshire.

Size of contributing watershed at the crossing location: 20.2 acres

☒ **Tier 1**: A tier 1 stream crossing is a crossing located on a watercourse where the contributing watershed size is less than or equal to 200 acres.

☐ **Tier 2**: A tier 2 stream crossing is a crossing located on a watercourse where the contributing watershed size is greater than 200 acres and less than 640 acres.

☐ **Tier 3**: A tier 3 stream crossing is a crossing that meets **any** of the following criteria:

- ☐ On a watercourse where the contributing watershed is more than 640 acres.
- ☐ Within a designated river corridor unless:
  - a. The crossing would be a tier 1 stream based on contributing watershed size, or
  - b. The structure does not create a direct surface water connection to the designated river as depicted on the national hydrography dataset as found on GRANIT.
- ☐ Within a 100-year floodplain (see Section 2 below).
- ☐ In a jurisdictional area having any protected species or habitat (NHB DataCheck).
- ☐ In a prime wetland or within a duly-established 100-foot buffer, unless a waiver has been granted pursuant to RSA 482-A:11, IV(b) and Env-Wt 706. Review the Wetlands Permit Planning Tool (WPPT) for town prime wetland and prime wetland buffer maps to determine if your project is within these areas.

☐ **Tier 4**: A tier 4 stream crossing is a crossing located on a tidal watercourse.

SECTION 2 - 100-YEAR FLOODPLAIN

Use the FEMA Map Service Center to determine if the crossing is located within a 100-year floodplain. Please answer the questions below:

☒ **No**: The proposed stream crossing *is not* within the FEMA 100-year floodplain.

☐ **Yes**: The proposed project *is* within the FEMA 100-year floodplain. Zone =

Elevation of the 100-year floodplain at the inlet: feet (FEMA El. or Modeled El.)

SECTION 3 - CALCULATING PEAK DISCHARGE

Existing 100-year peak discharge (Q) calculated in cubic feet per second (CFS): CFS	Calculation method:
Estimated bankfull discharge at the crossing location: CFS	Calculation method:

Note: If tier 1, then skip to Section 10

SECTION 4 - PREDICTED CHANNEL GEOMETRY BASED ON REGIONAL HYDRAULIC CURVES *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Bankfull Width: 2.3 feet	Mean Bankfull Depth: 0.5 feet
Bankfull Cross Sectional Area: 1.2 square feet (SF)	

SECTION 5 - CROSS SECTIONAL CHANNEL GEOMETRY: MEASUREMENTS OF THE EXISTING STREAM WITHIN A REFERENCE REACH *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Describe the reference reach location: Forested reach ~209' upstream of crossing's inlet
Reference reach watershed size: 20.2 acres

Parameter	**Cross Section 1** Describe bed form riffle (*e.g. pool, riffle, glide*)	**Cross Section 2** Describe bed form run/glide (*e.g. pool, riffle, glide*)	**Cross Section 3** Describe bed form riffle (*e.g. pool, riffle, glide*)	**Range**
Bankfull Width	6.4 feet	4.6 feet	5.2 feet	4.6-6.4 1.8 feet
Bankfull Cross Sectional Area	3 SF	1.4 SF	2.2 SF	1.4-3 1.6 SF
Mean Bankfull Depth	0.5 feet	0.35 feet	0.44 feet	0.35-0.5 0.15 feet
Width to Depth Ratio	12.8	13.14	11.82	11.82-13.14 1.32
Max Bankfull Depth	0.7 feet	0.6 feet	0.6 feet	0.6-0.7 0.1 feet
Flood Prone Width	8.1 feet	8.2 feet	8.8 feet	8.1-8.8 0.7 feet
Entrenchment Ratio	1.27	1.78	1.69	1.27-1.78 0.51

*Use **Figure 1** below to determine the measurements of the Reference Reach Attributes*

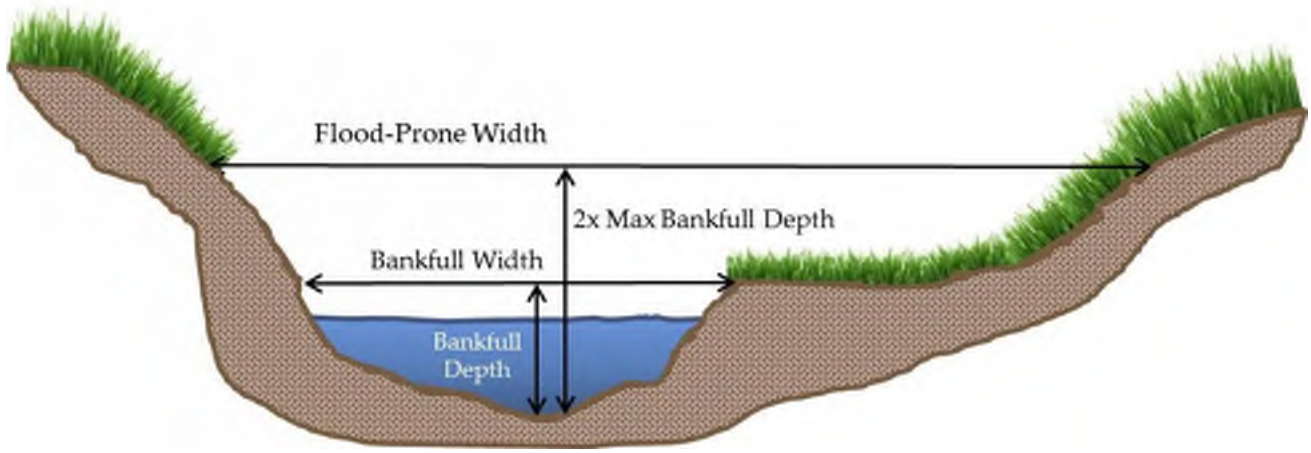

Figure 1: Determining the Reference Reach Attributes.

SECTION 6 - LONGITUDINAL PARAMETERS OF THE REFERENCE REACH AND CROSSING LOCATION *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Average Channel Slope of the Reference Reach: 5%
Average Channel Slope at the Crossing Location: Not surveyable

SECTION 7 - PLAN VIEW GEOMETRY Note: Sinuosity is measured a distance of at least 20 times bankfull width, or 2 meander belt widths. *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Sinuosity of the Reference Reach: 1.1	
Sinuosity of the Crossing Location: 1.6	
SECTION 8 - SUBSTRATE CLASSIFICATION BASED ON FIELD OBSERVATIONS *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
% of reach that is bedrock:	**0** %
% of reach that is boulder:	**1** %
% of reach that is cobble:	**40** %
% of reach that is gravel:	**8** %
% of reach that is sand:	**31** %
% of reach that is silt:	**20 - MUCK** %
SECTION 9 - STREAM TYPE OF REFERENCE REACH *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Stream Type of Reference Reach:	B

*Refer to Rosgen Classification Chart (**Figure 2**) below:*

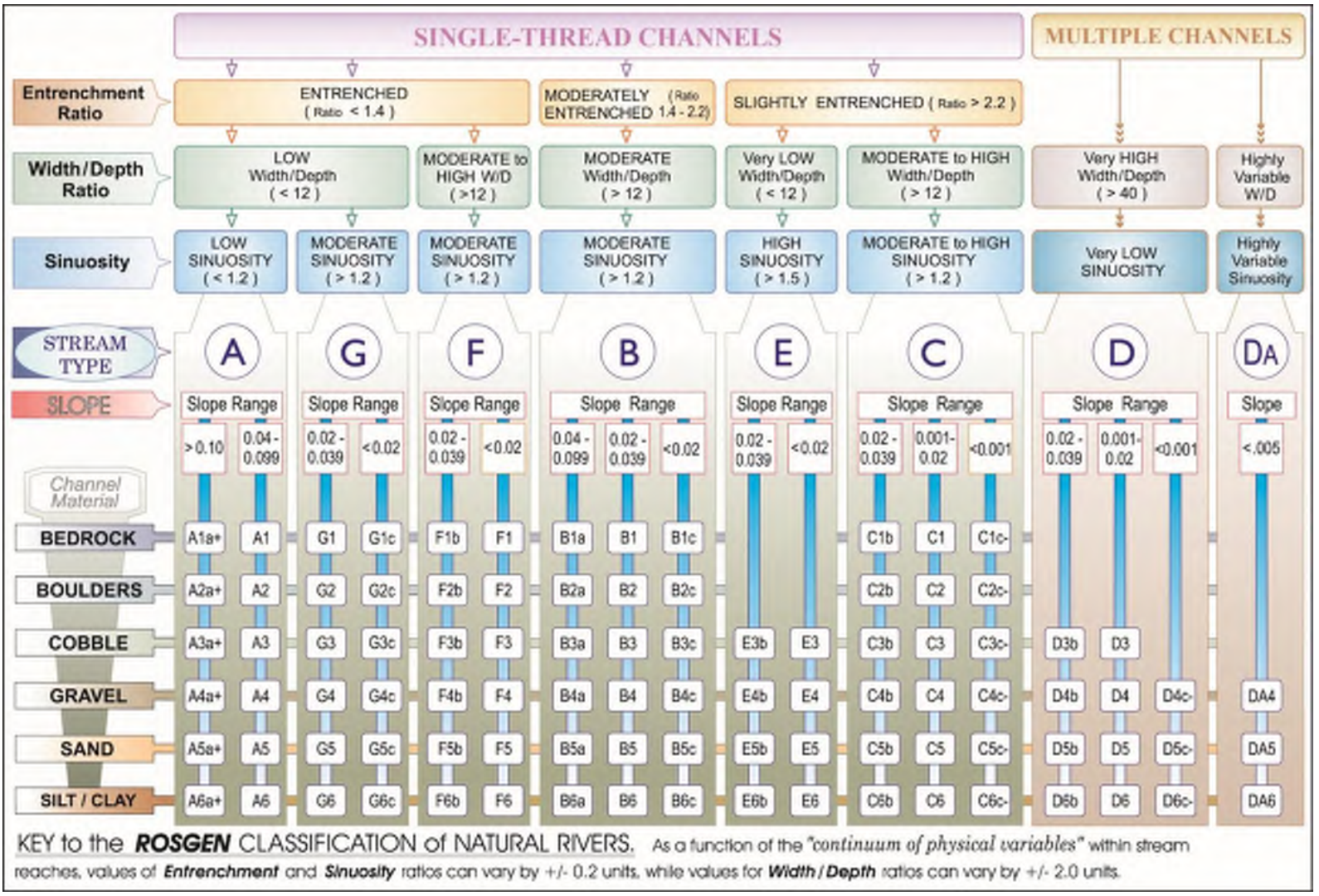

Figure 2: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 10 - CROSSING STRUCTURE METRICS					
Existing Conditions	**Existing Structure Type:** ☐ Bridge span ☐ Pipe arch ☐ Open-bottom culvert ☐ Closed-bottom culvert ☐ Closed-bottom culvert with stream simulation ☐ Other:				
	Existing Crossing Span: *(perpendicular to flow)* feet	**Culvert Diameter:** feet **Inlet Elevation:** El. feet			
	Existing Crossing Length: *(parallel to flow)* feet	**Outlet Elevation:** El. feet **Culvert Slope:**			
Proposed Conditions	**Proposed Structure Type:**	**Tier 1**	**Tier 2**	**Tier 3**	**Alternative Design**
	Bridge Span	☐	☐	☐	☐
	Pipe Arch	☐	☐		☐
	Closed-bottom Culvert	☐	☐		☐
	Open-bottom Culvert	☐	☐	☐	☐
	Closed-bottom Culvert with stream simulation	☐	☐	☐	☐
	Proposed Structure Span: feet	**Culvert Diameter:** feet			

	(perpendicular to flow)	**Inlet Elevation:** El. feet
	Proposed Structure Length: feet *(parallel to flow)*	**Outlet Elevation:** El. feet **Culvert Slope:**
	Proposed Entrenchment Ratio:* *For **Tier 2**, **Tier 3** and **Tier 4** Crossings Only. To accommodate the entrenchment ratio, floodplain drainage structures may be utilized.*	

** Note: Proposed Entrenchment Ratio must meet the minimum ratio for each stream type listed in **Figure 3**, otherwise the applicant must address the Alternative Design criteria listed in Env-Wt 904.10.*

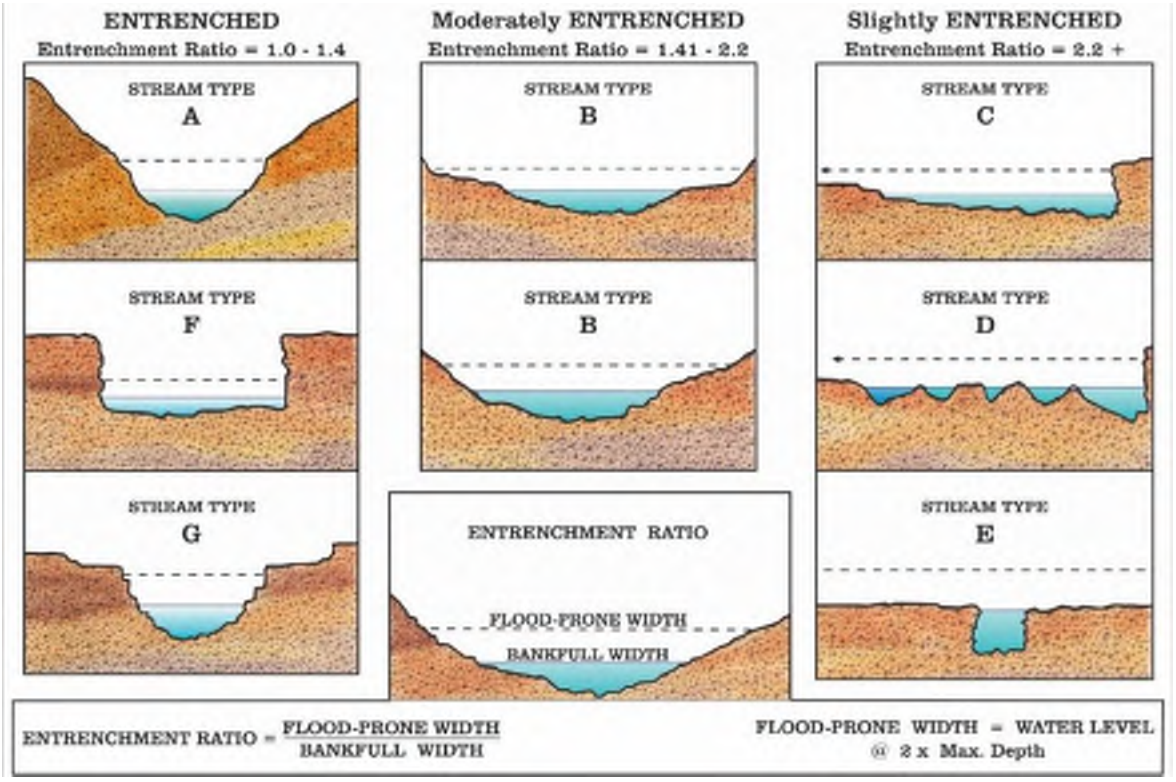

Figure 3: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 11 - CROSSING STRUCTURE HYDRAULICS		
	Existing	**Proposed**
100 year flood stage elevation at inlet:		
Flow velocity at outlet in feet per second (FPS):		
Calculated 100 year peak discharge (Q) for the *proposed* structure in CFS:		
Calculated 50 year peak discharge (Q) for the *proposed* structure in CFS:		

SECTION 12 - CROSSING STRUCTURE OPENNESS RATIO *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Crossing Structure Openness Ratio* = 0.03 * Openness box culvert = (height x width)/length Openness round culvert = (3.14 x radius^2)/length

SECTION 13 - GENERAL DESIGN CONSIDERATIONS

Env-Wt 904.01 requires all stream crossings to be designed and constructed according to the following requirements. Check each box if the project meets these general design considerations.

All stream crossings shall be designed and constructed so as to:

- ☐ Not be a barrier to sediment transport.
- ☐ Prevent the restriction of high flows and maintain existing low flows.
- ☐ Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction.
- ☐ Not cause an increase in the frequency of flooding or overtopping of banks.
- ☐ Maintain or enhance geomorphic compatibility by:
  a. Minimizing the potential for inlet obstruction by sediment, wood, or debris, and
  b. Preserving the natural alignment of the stream channel.
- ☐ Preserve watercourse connectivity where it currently exists.
- ☐ Restore watercourse connectivity where:
  a. Connectivity previously was disrupted as a result of human activity(ies), and
  b. Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both.
- ☐ Not cause erosion, aggradation, or scouring upstream or downstream of the crossing.
- ☐ Not cause water quality degradation.

SECTION 14 - TIER-SPECIFIC DESIGN CRITERIA

Stream crossings must be designed in accordance with the tier specific design criteria listed in Part Env-Wt 904.

- ☐ The proposed project meets the tier specific design criteria listed in Part Env-Wt 904 and each requirement has been addressed in the plans and as part of the wetland application.

SECTION 15 - ALTERNATIVE DESIGN

NOTE: If the proposed crossing does not meet all of the general design considerations, the tier specific design criteria, or the minimum entrenchment ratio for each given stream type listed in **Figure 3**, then an alternative design plan and associated requirements must be addressed pursuant to Env-Wt 904.10.

- ☐ I have submitted an alternative design and addressed each requirement listed in Env-Wt 904.10.

NHDES-W-06-071

WETLANDS PERMIT APPLICATION
STREAM CROSSING WORKSHEET
Water Division/Land Resources Management
Wetlands Bureau

RSA/Rule RSA 482-A/ Env-Wt-900

This worksheet can be used to accompany Wetlands Permit Applications when proposing stream crossings.

SECTION 1 - TIER CLASSIFICATIONS

Determine the contributing watershed size at USGS StreamStats.

Note: Plans for tier 2 and 3 crossings shall be designed and stamped by a professional engineer who is licensed under RSA 310-A to practice in New Hampshire.

Size of contributing watershed at the crossing location: 20.5 acres

☒ **Tier 1**: A tier 1 stream crossing is a crossing located on a watercourse where the contributing watershed size is less than or equal to 200 acres.

☐ **Tier 2**: A tier 2 stream crossing is a crossing located on a watercourse where the contributing watershed size is greater than 200 acres and less than 640 acres.

☐ **Tier 3**: A tier 3 stream crossing is a crossing that meets **any** of the following criteria:

- ☐ On a watercourse where the contributing watershed is more than 640 acres.
- ☐ Within a designated river corridor unless:
  - a. The crossing would be a tier 1 stream based on contributing watershed size, or
  - b. The structure does not create a direct surface water connection to the designated river as depicted on the national hydrography dataset as found on GRANIT.
- ☐ Within a 100-year floodplain (see Section 2 below).
- ☐ In a jurisdictional area having any protected species or habitat (NHB DataCheck).
- ☐ In a prime wetland or within a duly-established 100-foot buffer, unless a waiver has been granted pursuant to RSA 482-A:11, IV(b) and Env-Wt 706. Review the Wetlands Permit Planning Tool (WPPT) for town prime wetland and prime wetland buffer maps to determine if your project is within these areas.

☐ **Tier 4**: A tier 4 stream crossing is a crossing located on a tidal watercourse.

SECTION 2 - 100-YEAR FLOODPLAIN

Use the FEMA Map Service Center to determine if the crossing is located within a 100-year floodplain. Please answer the questions below:

☒ **No**: The proposed stream crossing *is not* within the FEMA 100-year floodplain.

☐ **Yes**: The proposed project *is* within the FEMA 100-year floodplain. Zone =

Elevation of the 100-year floodplain at the inlet: feet (FEMA El. or Modeled El.)

SECTION 3 - CALCULATING PEAK DISCHARGE

Existing 100-year peak discharge (Q) calculated in cubic feet per second (CFS): CFS	Calculation method:
Estimated bankfull discharge at the crossing location: CFS	Calculation method:

➡ ***Note: If tier 1, then skip to Section 10*** ⬅

SECTION 4 - PREDICTED CHANNEL GEOMETRY BASED ON REGIONAL HYDRAULIC CURVES *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Bankfull Width: 2.3 feet	Mean Bankfull Depth: 0.52 feet
Bankfull Cross Sectional Area: 1.19 square feet (SF)	

SECTION 5 - CROSS SECTIONAL CHANNEL GEOMETRY: MEASUREMENTS OF THE EXISTING STREAM WITHIN A REFERENCE REACH *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Describe the reference reach location: upstream of the inlet; between NB & SB barrels.
Reference reach watershed size: 20.5 acres

Parameter	**Cross Section 1** Describe bed form run/glide (*e.g. pool, riffle, glide*)	**Cross Section 2** Describe bed form run/glide (*e.g. pool, riffle, glide*)	**Cross Section 3** Describe bed form pool (*e.g. pool, riffle, glide*)	**Range**
Bankfull Width	4.2 feet	5.4 feet	4.8 feet	4.2-5.4 = 1.2 feet
Bankfull Cross Sectional Area	2.6 SF	2.5 SF	2.2 SF	2.2-2.6 = 0.4 SF
Mean Bankfull Depth	0.7 feet	0.5 feet	0.7 feet	0.5-0.7 = 0.2 feet
Width to Depth Ratio	6.5	10.8	8.7	6.5-10.8 = 4.3
Max Bankfull Depth	1 feet	0.8 feet	0.7 feet	0.7-1 = 0.3 feet
Flood Prone Width	7 feet	9.2 feet	12 feet	7-12 = 5 feet
Entrenchment Ratio	1.7	1.70	2.5	1.7-2.5 = 0.8

*Use **Figure 1** below to determine the measurements of the Reference Reach Attributes*

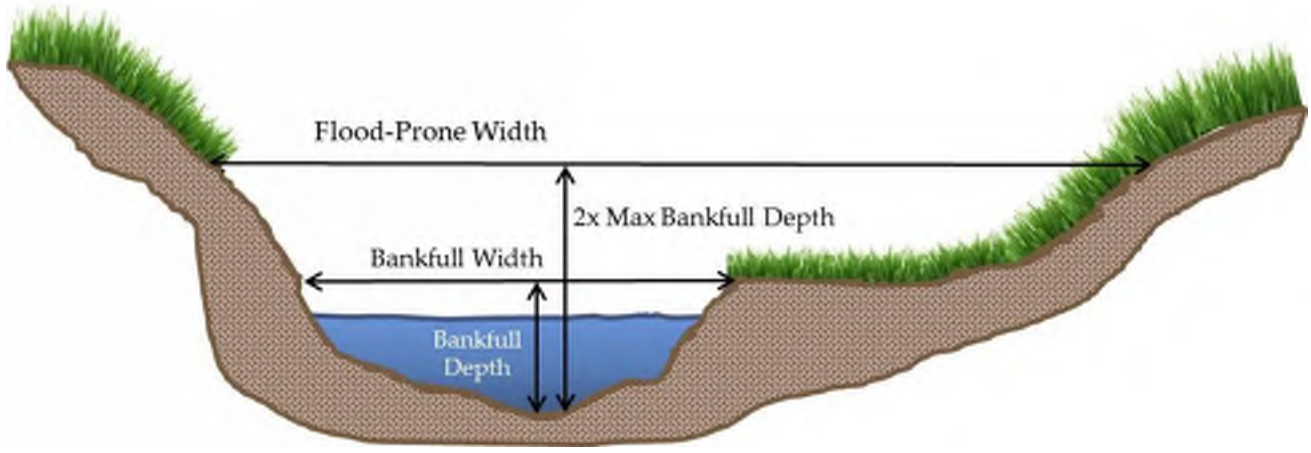

Figure 1: Determining the Reference Reach Attributes.

SECTION 6 - LONGITUDINAL PARAMETERS OF THE REFERENCE REACH AND CROSSING LOCATION *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Average Channel Slope of the Reference Reach: 28%
Average Channel Slope at the Crossing Location: Not surveyable
SECTION 7 - PLAN VIEW GEOMETRY

Note: Sinuosity is measured a distance of at least 20 times bankfull width, or 2 meander belt widths. *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Sinuosity of the Reference Reach: 0.97	
Sinuosity of the Crossing Location: 0.97	
SECTION 8 - SUBSTRATE CLASSIFICATION BASED ON FIELD OBSERVATIONS *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
% of reach that is bedrock:	**0** %
% of reach that is boulder:	**73** %
% of reach that is cobble:	**5** %
% of reach that is gravel:	**5** %
% of reach that is sand:	**7** %
% of reach that is silt:	**0** %
SECTION 9 - STREAM TYPE OF REFERENCE REACH *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Stream Type of Reference Reach:	B

*Refer to Rosgen Classification Chart (**Figure 2**) below:*

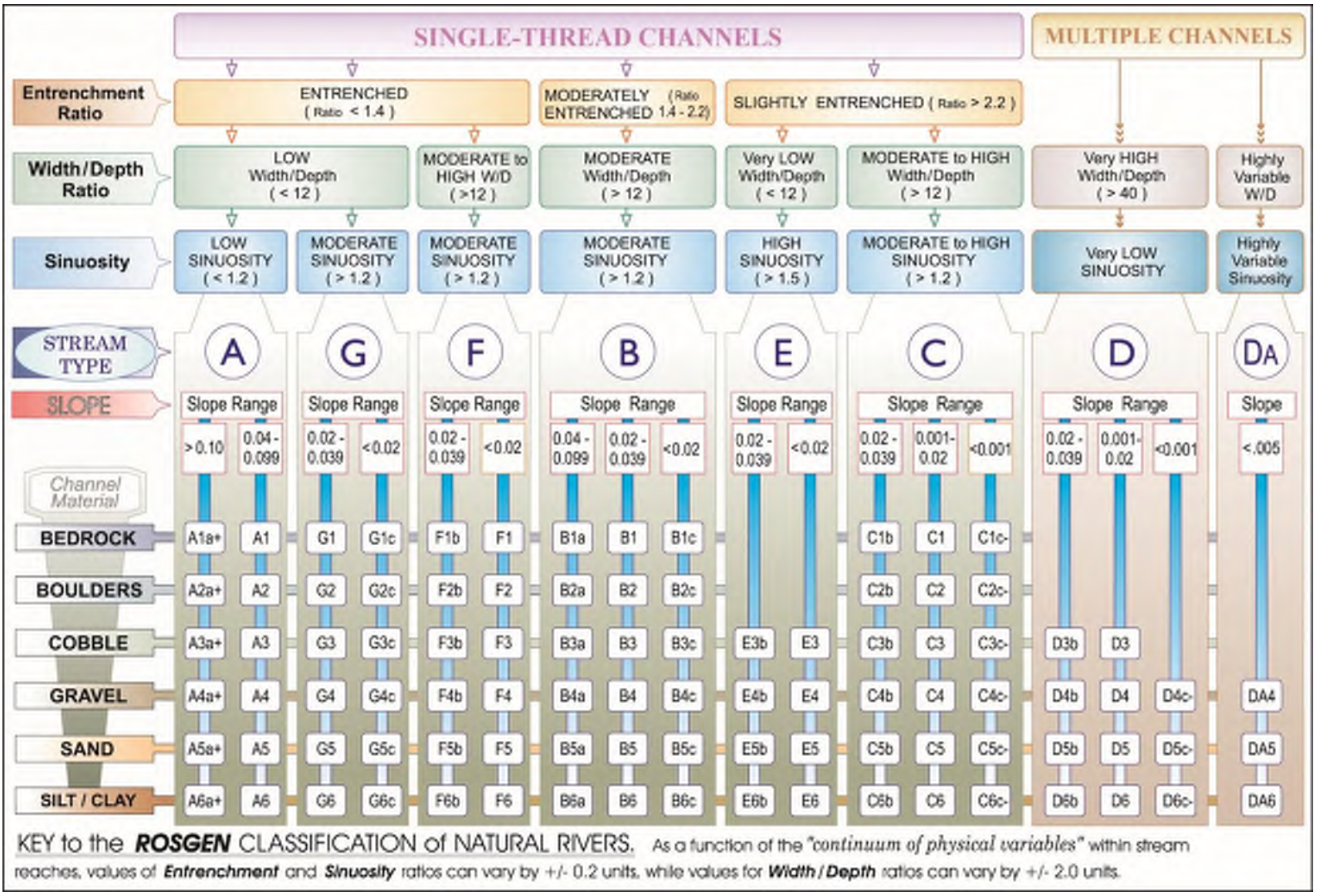

Figure 2: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 10 - CROSSING STRUCTURE METRICS					
Existing Conditions	**Existing Structure Type:** ☐ Bridge span ☐ Pipe arch ☐ Open-bottom culvert ☐ Closed-bottom culvert ☐ Closed-bottom culvert with stream simulation ☐ Other:				
	Existing Crossing Span: *(perpendicular to flow)* feet	**Culvert Diameter:** feet **Inlet Elevation:** El. feet			
	Existing Crossing Length: *(parallel to flow)* feet	**Outlet Elevation:** El. feet **Culvert Slope:**			
Proposed Conditions	**Proposed Structure Type:**	**Tier 1**	**Tier 2**	**Tier 3**	**Alternative Design**
	Bridge Span	☐	☐	☐	☐
	Pipe Arch	☐	☐		☐
	Closed-bottom Culvert	☐	☐		☐
	Open-bottom Culvert	☐	☐	☐	☐
	Closed-bottom Culvert with stream simulation	☐	☐	☐	☐
	Proposed Structure Span: feet	**Culvert Diameter:** feet			

	(perpendicular to flow)	**Inlet Elevation:** El. feet
	Proposed Structure Length: feet *(parallel to flow)*	**Outlet Elevation:** El. feet **Culvert Slope:**
	Proposed Entrenchment Ratio:* *For **Tier 2**, **Tier 3** and **Tier 4** Crossings Only. To accommodate the entrenchment ratio, floodplain drainage structures may be utilized.*	

** Note: Proposed Entrenchment Ratio must meet the minimum ratio for each stream type listed in **Figure 3**, otherwise the applicant must address the Alternative Design criteria listed in Env-Wt 904.10.*

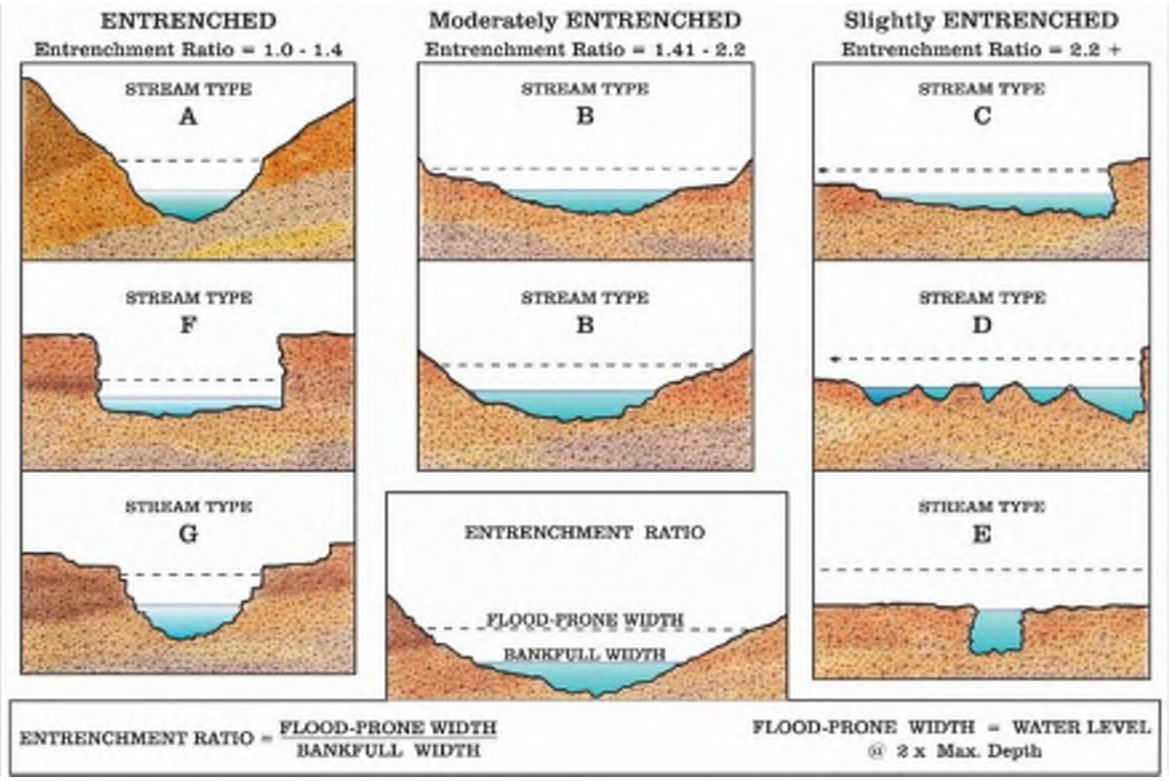

Figure 3: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 11 - CROSSING STRUCTURE HYDRAULICS		
	Existing	**Proposed**
100 year flood stage elevation at inlet:		
Flow velocity at outlet in feet per second (FPS):		
Calculated 100 year peak discharge (Q) for the *proposed* structure in CFS:		
Calculated 50 year peak discharge (Q) for the *proposed* structure in CFS:		
SECTION 12 - CROSSING STRUCTURE OPENNESS RATIO *For **tier 2**, **tier 3** and **tier 4** crossings only.*		
Crossing Structure Openness Ratio* = 0.02 * Openness box culvert = (height x width)/length Openness round culvert = (3.14 x radius^2)/length		

SECTION 13 - GENERAL DESIGN CONSIDERATIONS

Env-Wt 904.01 requires all stream crossings to be designed and constructed according to the following requirements. Check each box if the project meets these general design considerations.

All stream crossings shall be designed and constructed so as to:

- ☐ Not be a barrier to sediment transport.
- ☐ Prevent the restriction of high flows and maintain existing low flows.
- ☐ Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction.
- ☐ Not cause an increase in the frequency of flooding or overtopping of banks.
- ☐ Maintain or enhance geomorphic compatibility by:
  a. Minimizing the potential for inlet obstruction by sediment, wood, or debris, and
  b. Preserving the natural alignment of the stream channel.
- ☐ Preserve watercourse connectivity where it currently exists.
- ☐ Restore watercourse connectivity where:
  a. Connectivity previously was disrupted as a result of human activity(ies), and
  b. Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both.
- ☐ Not cause erosion, aggradation, or scouring upstream or downstream of the crossing.
- ☐ Not cause water quality degradation.

SECTION 14 - TIER-SPECIFIC DESIGN CRITERIA

Stream crossings must be designed in accordance with the tier specific design criteria listed in Part Env-Wt 904.

- ☐ The proposed project meets the tier specific design criteria listed in Part Env-Wt 904 and each requirement has been addressed in the plans and as part of the wetland application.

SECTION 15 - ALTERNATIVE DESIGN

NOTE: If the proposed crossing does not meet all of the general design considerations, the tier specific design criteria, or the minimum entrenchment ratio for each given stream type listed in **Figure 3**, then an alternative design plan and associated requirements must be addressed pursuant to Env-Wt 904.10.

- ☐ I have submitted an alternative design and addressed each requirement listed in Env-Wt 904.10.

NHDES-W-06-071

WETLANDS PERMIT APPLICATION
STREAM CROSSING WORKSHEET
Water Division/Land Resources Management
Wetlands Bureau

RSA/Rule RSA 482-A/ Env-Wt-900

This worksheet can be used to accompany Wetlands Permit Applications when proposing stream crossings.

SECTION 1 - TIER CLASSIFICATIONS

Determine the contributing watershed size at USGS StreamStats.

Note: Plans for tier 2 and 3 crossings shall be designed and stamped by a professional engineer who is licensed under RSA 310-A to practice in New Hampshire.

Size of contributing watershed at the crossing location: 55.7 acres

☒ **Tier 1**: A tier 1 stream crossing is a crossing located on a watercourse where the contributing watershed size is less than or equal to 200 acres.

☐ **Tier 2**: A tier 2 stream crossing is a crossing located on a watercourse where the contributing watershed size is greater than 200 acres and less than 640 acres.

☐ **Tier 3**: A tier 3 stream crossing is a crossing that meets **any** of the following criteria:

- ☐ On a watercourse where the contributing watershed is more than 640 acres.
- ☐ Within a designated river corridor unless:
  - a. The crossing would be a tier 1 stream based on contributing watershed size, or
  - b. The structure does not create a direct surface water connection to the designated river as depicted on the national hydrography dataset as found on GRANIT.
- ☐ Within a 100-year floodplain (see Section 2 below).
- ☐ In a jurisdictional area having any protected species or habitat (NHB DataCheck).
- ☐ In a prime wetland or within a duly-established 100-foot buffer, unless a waiver has been granted pursuant to RSA 482-A:11, IV(b) and Env-Wt 706. Review the Wetlands Permit Planning Tool (WPPT) for town prime wetland and prime wetland buffer maps to determine if your project is within these areas.

☐ **Tier 4**: A tier 4 stream crossing is a crossing located on a tidal watercourse.

SECTION 2 - 100-YEAR FLOODPLAIN

Use the FEMA Map Service Center to determine if the crossing is located within a 100-year floodplain. Please answer the questions below:

☒ **No**: The proposed stream crossing *is not* within the FEMA 100-year floodplain.

☐ **Yes**: The proposed project *is* within the FEMA 100-year floodplain. Zone =

Elevation of the 100-year floodplain at the inlet: feet (FEMA El. or Modeled El.)

SECTION 3 - CALCULATING PEAK DISCHARGE

Existing 100-year peak discharge (Q) calculated in cubic feet per second (CFS): CFS	Calculation method:
Estimated bankfull discharge at the crossing location: CFS	Calculation method:

⟶ ***Note: If tier 1, then skip to Section 10*** ⟵

SECTION 4 - PREDICTED CHANNEL GEOMETRY BASED ON REGIONAL HYDRAULIC CURVES *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Bankfull Width: 3.8 feet	Mean Bankfull Depth: 0.7 feet
Bankfull Cross Sectional Area: 2.5 square feet (SF)	

SECTION 5 - CROSS SECTIONAL CHANNEL GEOMETRY: MEASUREMENTS OF THE EXISTING STREAM WITHIN A REFERENCE REACH *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Describe the reference reach location: Forrest reach ~144' upstream of crossing's inlet
Reference reach watershed size: 55.7 acres

Parameter	**Cross Section 1** Describe bed form run/glide (*e.g. pool, riffle, glide*)	**Cross Section 2** Describe bed form run/glide (*e.g. pool, riffle, glide*)	**Cross Section 3** Describe bed form riffle (*e.g. pool, riffle, glide*)	**Range**
Bankfull Width	3.6 feet	3.8 feet	3.6 feet	3.6-3.8 0.2 feet
Bankfull Cross Sectional Area	0.9 SF	1.1 SF	1.3 SF	0.9-1.3 0.4 SF
Mean Bankfull Depth	0.3 feet	0.37 feet	0.43 feet	0.3-0.43 0.13 feet
Width to Depth Ratio	12	10.36	8.31	8.31-12 3.69
Max Bankfull Depth	0.3 feet	0.4 feet	0.5 feet	0.3-0.5 0.2 feet
Flood Prone Width	6.1 feet	16.5 feet	7.2 feet	6.1-16.5 10.4 feet
Entrenchment Ratio	1.69	4.34	2	1.69-4.34 2.65

*Use **Figure 1** below to determine the measurements of the Reference Reach Attributes*

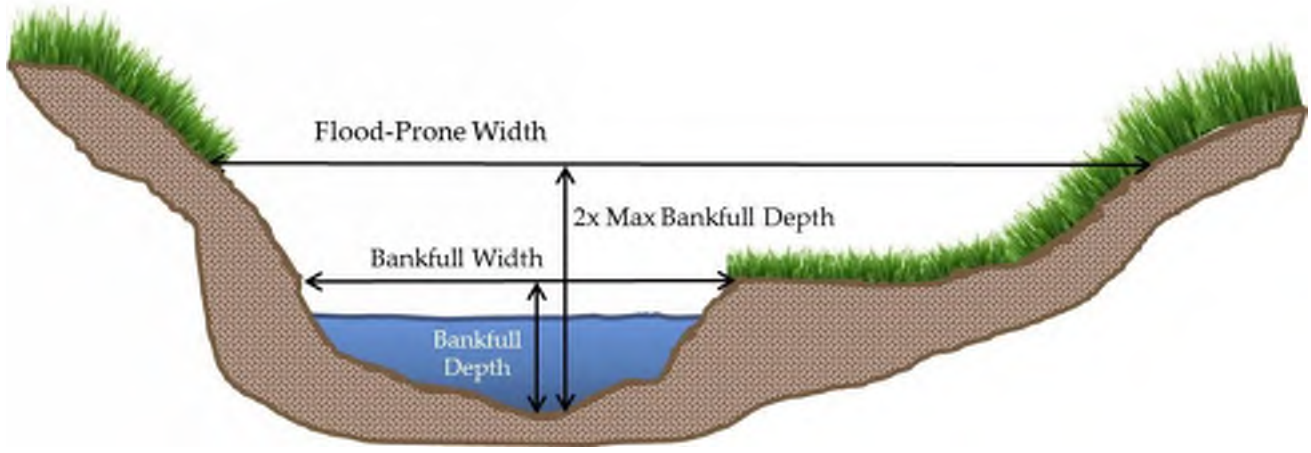

Figure 1: Determining the Reference Reach Attributes.

SECTION 6 - LONGITUDINAL PARAMETERS OF THE REFERENCE REACH AND CROSSING LOCATION *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Average Channel Slope of the Reference Reach: 12%
Average Channel Slope at the Crossing Location: Unsurveyable
SECTION 7 - PLAN VIEW GEOMETRY

Note: Sinuosity is measured a distance of at least 20 times bankfull width, or 2 meander belt widths. *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Sinuosity of the Reference Reach: 1.1	
Sinuosity of the Crossing Location: 1.1	
SECTION 8 - SUBSTRATE CLASSIFICATION BASED ON FIELD OBSERVATIONS *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
% of reach that is bedrock:	**0** %
% of reach that is boulder:	**10** %
% of reach that is cobble:	**0** %
% of reach that is gravel:	**10** %
% of reach that is sand:	**80** %
% of reach that is silt:	**0** %
SECTION 9 - STREAM TYPE OF REFERENCE REACH *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Stream Type of Reference Reach:	B

*Refer to Rosgen Classification Chart (**Figure 2**) below:*

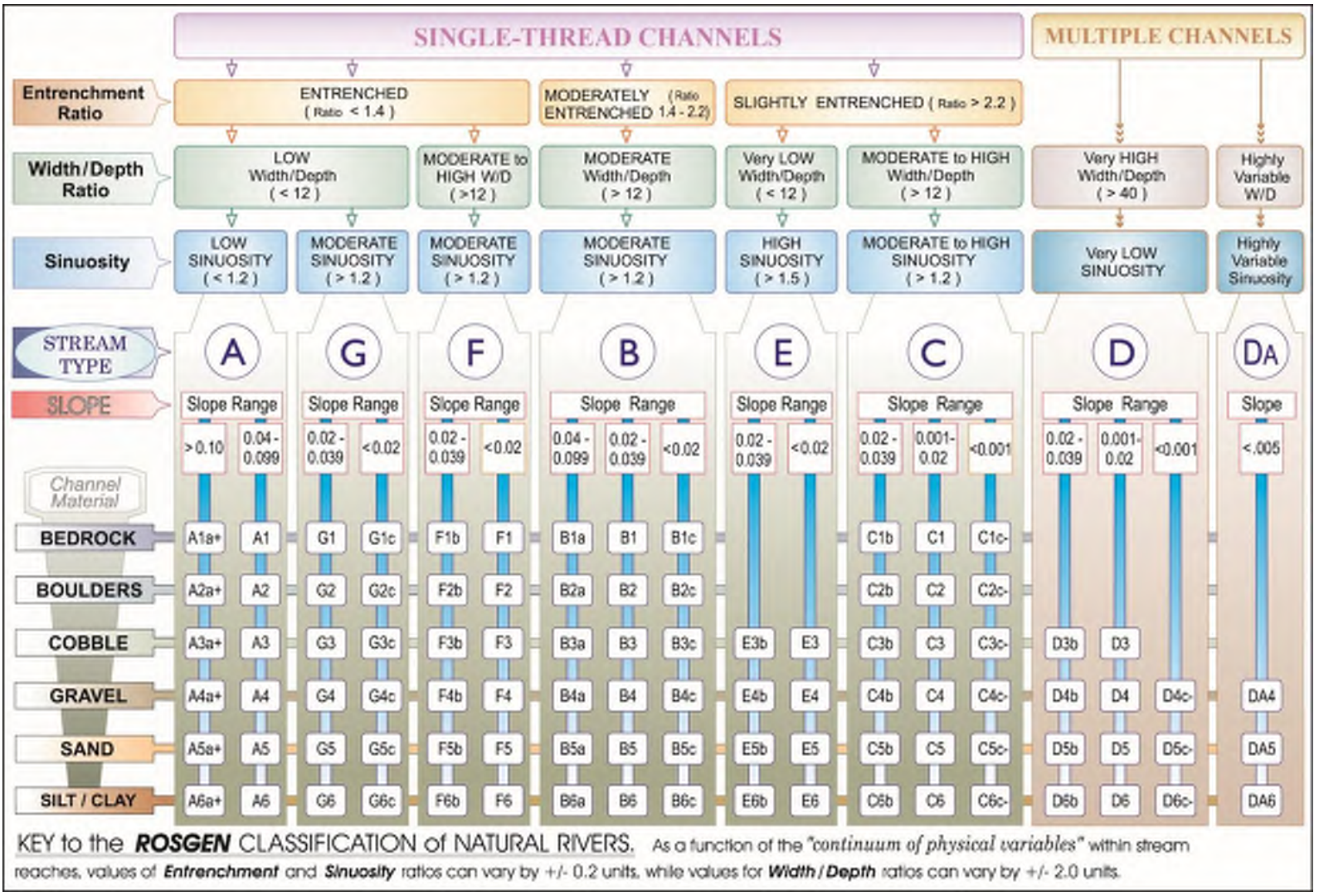

Figure 2: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 10 - CROSSING STRUCTURE METRICS					
Existing Conditions	**Existing Structure Type:** ☐ Bridge span ☐ Pipe arch ☐ Open-bottom culvert ☐ Closed-bottom culvert ☐ Closed-bottom culvert with stream simulation ☐ Other:				
	Existing Crossing Span: *(perpendicular to flow)* feet	**Culvert Diameter:** feet **Inlet Elevation:** El. feet			
	Existing Crossing Length: *(parallel to flow)* feet	**Outlet Elevation:** El. feet **Culvert Slope:**			
Proposed Conditions	**Proposed Structure Type:**	**Tier 1**	**Tier 2**	**Tier 3**	**Alternative Design**
	Bridge Span	☐	☐	☐	☐
	Pipe Arch	☐	☐		☐
	Closed-bottom Culvert	☐	☐		☐
	Open-bottom Culvert	☐	☐	☐	☐
	Closed-bottom Culvert with stream simulation	☐	☐	☐	☐
	Proposed Structure Span: feet	**Culvert Diameter:** feet			

	(perpendicular to flow)	**Inlet Elevation:** El. feet
	Proposed Structure Length: feet *(parallel to flow)*	**Outlet Elevation:** El. feet **Culvert Slope:**
	Proposed Entrenchment Ratio:* *For **Tier 2**, **Tier 3** and **Tier 4** Crossings Only. To accommodate the entrenchment ratio, floodplain drainage structures may be utilized.*	

** Note: Proposed Entrenchment Ratio must meet the minimum ratio for each stream type listed in **Figure 3**, otherwise the applicant must address the Alternative Design criteria listed in Env-Wt 904.10.*

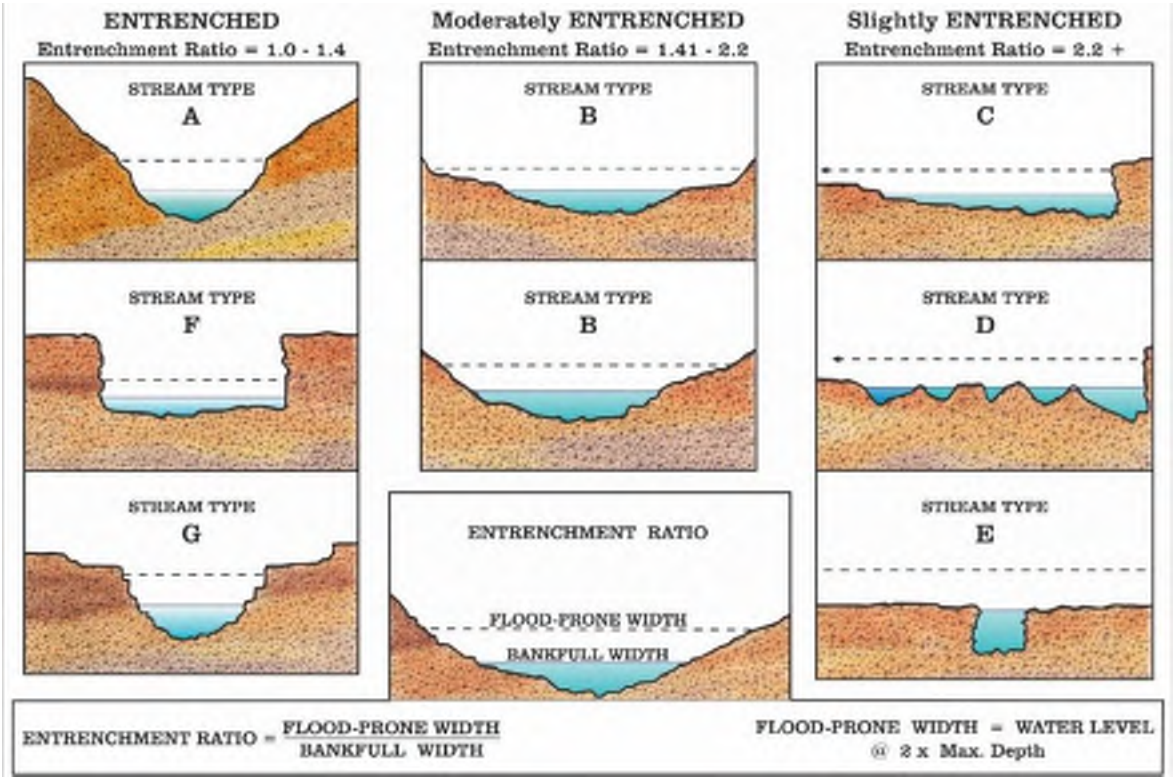

Figure 3: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 11 - CROSSING STRUCTURE HYDRAULICS		
	Existing	**Proposed**
100 year flood stage elevation at inlet:		
Flow velocity at outlet in feet per second (FPS):		
Calculated 100 year peak discharge (Q) for the *proposed* structure in CFS:		
Calculated 50 year peak discharge (Q) for the *proposed* structure in CFS:		
SECTION 12 - CROSSING STRUCTURE OPENNESS RATIO *For **tier 2**, **tier 3** and **tier 4** crossings only.*		
Crossing Structure Openness Ratio* = 0.05 * Openness box culvert = (height x width)/length Openness round culvert = (3.14 x radius^2)/length		

SECTION 13 - GENERAL DESIGN CONSIDERATIONS

Env-Wt 904.01 requires all stream crossings to be designed and constructed according to the following requirements. Check each box if the project meets these general design considerations.

All stream crossings shall be designed and constructed so as to:

- ☐ Not be a barrier to sediment transport.
- ☐ Prevent the restriction of high flows and maintain existing low flows.
- ☐ Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction.
- ☐ Not cause an increase in the frequency of flooding or overtopping of banks.
- ☐ Maintain or enhance geomorphic compatibility by:
  a. Minimizing the potential for inlet obstruction by sediment, wood, or debris, and
  b. Preserving the natural alignment of the stream channel.
- ☐ Preserve watercourse connectivity where it currently exists.
- ☐ Restore watercourse connectivity where:
  a. Connectivity previously was disrupted as a result of human activity(ies), and
  b. Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both.
- ☐ Not cause erosion, aggradation, or scouring upstream or downstream of the crossing.
- ☐ Not cause water quality degradation.

SECTION 14 - TIER-SPECIFIC DESIGN CRITERIA

Stream crossings must be designed in accordance with the tier specific design criteria listed in Part Env-Wt 904.

- ☐ The proposed project meets the tier specific design criteria listed in Part Env-Wt 904 and each requirement has been addressed in the plans and as part of the wetland application.

SECTION 15 - ALTERNATIVE DESIGN

NOTE: If the proposed crossing does not meet all of the general design considerations, the tier specific design criteria, or the minimum entrenchment ratio for each given stream type listed in **Figure 3**, then an alternative design plan and associated requirements must be addressed pursuant to Env-Wt 904.10.

- ☐ I have submitted an alternative design and addressed each requirement listed in Env-Wt 904.10.

WETLANDS PERMIT APPLICATION
STREAM CROSSING WORKSHEET
Water Division/Land Resources Management
Wetlands Bureau

RSA/Rule RSA 482-A/ Env-Wt-900

This worksheet can be used to accompany Wetlands Permit Applications when proposing stream crossings.

SECTION 1 - TIER CLASSIFICATIONS

Determine the contributing watershed size at USGS StreamStats.

Note: Plans for tier 2 and 3 crossings shall be designed and stamped by a professional engineer who is licensed under RSA 310-A to practice in New Hampshire.

Size of contributing watershed at the crossing location: 66 acres

☒ **Tier 1**: A tier 1 stream crossing is a crossing located on a watercourse where the contributing watershed size is less than or equal to 200 acres.

☐ **Tier 2**: A tier 2 stream crossing is a crossing located on a watercourse where the contributing watershed size is greater than 200 acres and less than 640 acres.

☐ **Tier 3**: A tier 3 stream crossing is a crossing that meets **any** of the following criteria:

- ☐ On a watercourse where the contributing watershed is more than 640 acres.
- ☐ Within a designated river corridor unless:
  - a. The crossing would be a tier 1 stream based on contributing watershed size, or
  - b. The structure does not create a direct surface water connection to the designated river as depicted on the national hydrography dataset as found on GRANIT.
- ☐ Within a 100-year floodplain (see Section 2 below).
- ☐ In a jurisdictional area having any protected species or habitat (NHB DataCheck).
- ☐ In a prime wetland or within a duly-established 100-foot buffer, unless a waiver has been granted pursuant to RSA 482-A:11, IV(b) and Env-Wt 706. Review the Wetlands Permit Planning Tool (WPPT) for town prime wetland and prime wetland buffer maps to determine if your project is within these areas.

☐ **Tier 4**: A tier 4 stream crossing is a crossing located on a tidal watercourse.

SECTION 2 - 100-YEAR FLOODPLAIN

Use the FEMA Map Service Center to determine if the crossing is located within a 100-year floodplain. Please answer the questions below:

☒ **No**: The proposed stream crossing *is not* within the FEMA 100-year floodplain.

☐ **Yes**: The proposed project *is* within the FEMA 100-year floodplain. Zone = _____

Elevation of the 100-year floodplain at the inlet: _____ feet (FEMA El. or Modeled El.)

SECTION 3 - CALCULATING PEAK DISCHARGE

Existing 100-year peak discharge (Q) calculated in cubic feet per second (CFS): _____ CFS	Calculation method: _____
Estimated bankfull discharge at the crossing location: _____ CFS	Calculation method: _____

➡ ***Note: If tier 1, then skip to Section 10*** ⬅

SECTION 4 - PREDICTED CHANNEL GEOMETRY BASED ON REGIONAL HYDRAULIC CURVES *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Bankfull Width: 4.1 feet	Mean Bankfull Depth: 0.7 feet
Bankfull Cross Sectional Area: 2.9 square feet (SF)	

SECTION 5 - CROSS SECTIONAL CHANNEL GEOMETRY: MEASUREMENTS OF THE EXISTING STREAM WITHIN A REFERENCE REACH *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Describe the reference reach location: Forested reach ~146' upstream of crossing's inlet
Reference reach watershed size: 66 acres

Parameter	**Cross Section 1** Describe bed form run/glide (*e.g. pool, riffle, glide*)	**Cross Section 2** Describe bed form run/glide (*e.g. pool, riffle, glide*)	**Cross Section 3** Describe bed form run/glide (*e.g. pool, riffle, glide*)	**Range**
Bankfull Width	6.5 feet	6 feet	4.3 feet	4.3-6.5 2.2 feet
Bankfull Cross Sectional Area	2.4 SF	2.7 SF	2 SF	2-2.7 0.7 SF
Mean Bankfull Depth	0.4 feet	0.54 feet	0.5 feet	0.4-0.54 0.14 feet
Width to Depth Ratio	16.25	11.11	8.6	8.6-16.25 7.65
Max Bankfull Depth	0.5 feet	0.6 feet	0.6 feet	0.5-0.6 0.1 feet
Flood Prone Width	10.7 feet	9 feet	13.3 feet	9-13.3 4.3 feet
Entrenchment Ratio	1.65	1.5	3.09	1.5-3.09 1.59

*Use **Figure 1** below to determine the measurements of the Reference Reach Attributes*

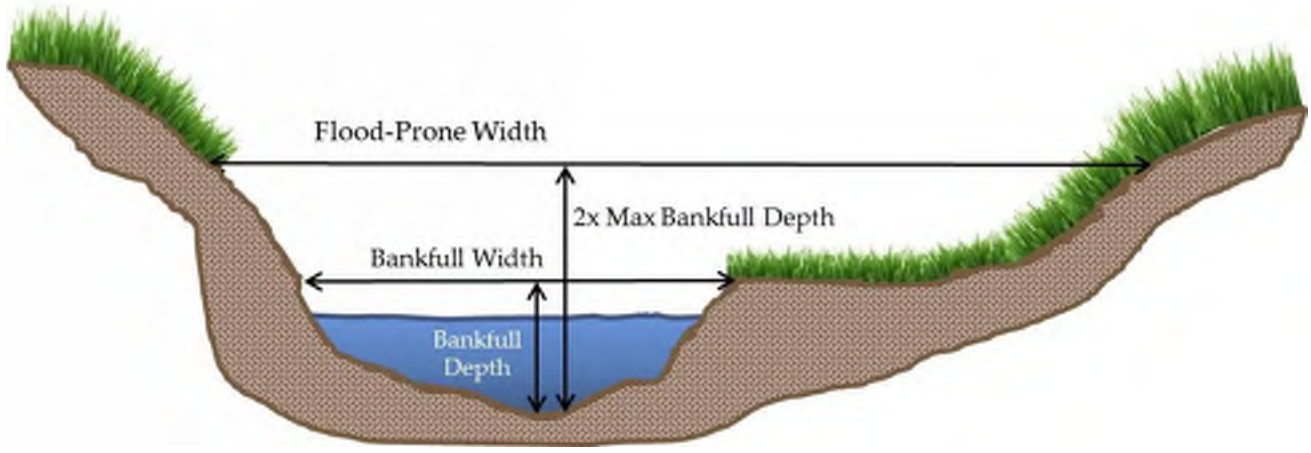

Figure 1: Determining the Reference Reach Attributes.

SECTION 6 - LONGITUDINAL PARAMETERS OF THE REFERENCE REACH AND CROSSING LOCATION *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Average Channel Slope of the Reference Reach: 6%
Average Channel Slope at the Crossing Location: Unsurveyable
SECTION 7 - PLAN VIEW GEOMETRY

Note: Sinuosity is measured a distance of at least 20 times bankfull width, or 2 meander belt widths. *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Sinuosity of the Reference Reach: 1.1	
Sinuosity of the Crossing Location: 1.4	
SECTION 8 - SUBSTRATE CLASSIFICATION BASED ON FIELD OBSERVATIONS *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
% of reach that is bedrock:	**0** %
% of reach that is boulder:	**0** %
% of reach that is cobble:	**0** %
% of reach that is gravel:	**40** %
% of reach that is sand:	**60** %
% of reach that is silt:	**0** %
SECTION 9 - STREAM TYPE OF REFERENCE REACH *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Stream Type of Reference Reach:	B

*Refer to Rosgen Classification Chart (**Figure 2**) below:*

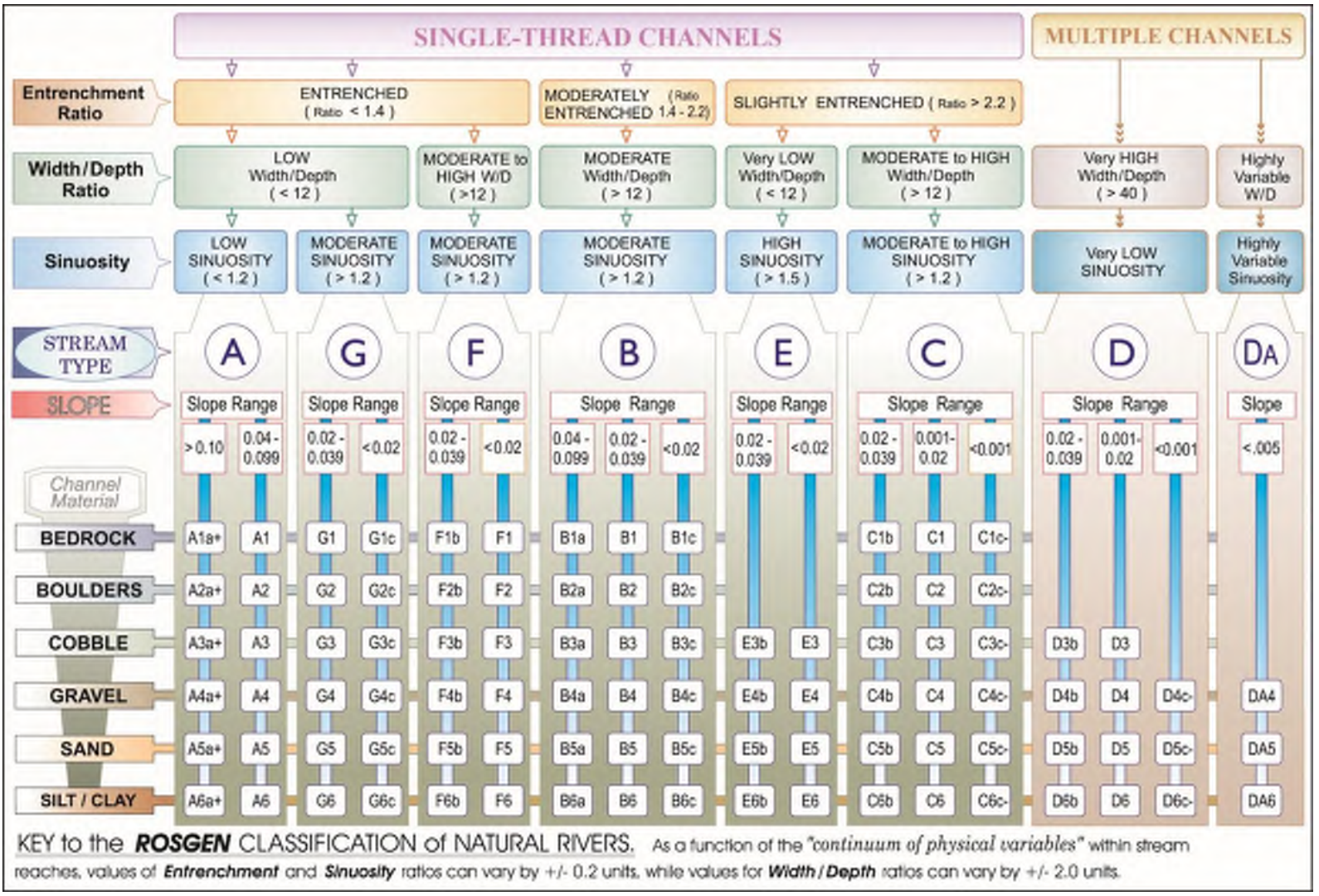

Figure 2: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 10 - CROSSING STRUCTURE METRICS					
Existing Conditions	**Existing Structure Type:** ☐ Bridge span ☐ Pipe arch ☐ Open-bottom culvert ☐ Closed-bottom culvert ☐ Closed-bottom culvert with stream simulation ☐ Other:				
	Existing Crossing Span: *(perpendicular to flow)* feet	**Culvert Diameter:** feet **Inlet Elevation:** El. feet			
	Existing Crossing Length: *(parallel to flow)* feet	**Outlet Elevation:** El. feet **Culvert Slope:**			
Proposed Conditions	**Proposed Structure Type:**	**Tier 1**	**Tier 2**	**Tier 3**	**Alternative Design**
	Bridge Span	☐	☐	☐	☐
	Pipe Arch	☐	☐		☐
	Closed-bottom Culvert	☐	☐		☐
	Open-bottom Culvert	☐	☐	☐	☐
	Closed-bottom Culvert with stream simulation	☐	☐	☐	☐
	Proposed Structure Span: feet	**Culvert Diameter:** feet			

	(perpendicular to flow)	**Inlet Elevation:** El. feet
	Proposed Structure Length: feet *(parallel to flow)*	**Outlet Elevation:** El. feet **Culvert Slope:**
	Proposed Entrenchment Ratio:* *For **Tier 2**, **Tier 3** and **Tier 4** Crossings Only. To accommodate the entrenchment ratio, floodplain drainage structures may be utilized.*	

** Note: Proposed Entrenchment Ratio must meet the minimum ratio for each stream type listed in **Figure 3**, otherwise the applicant must address the Alternative Design criteria listed in Env-Wt 904.10.*

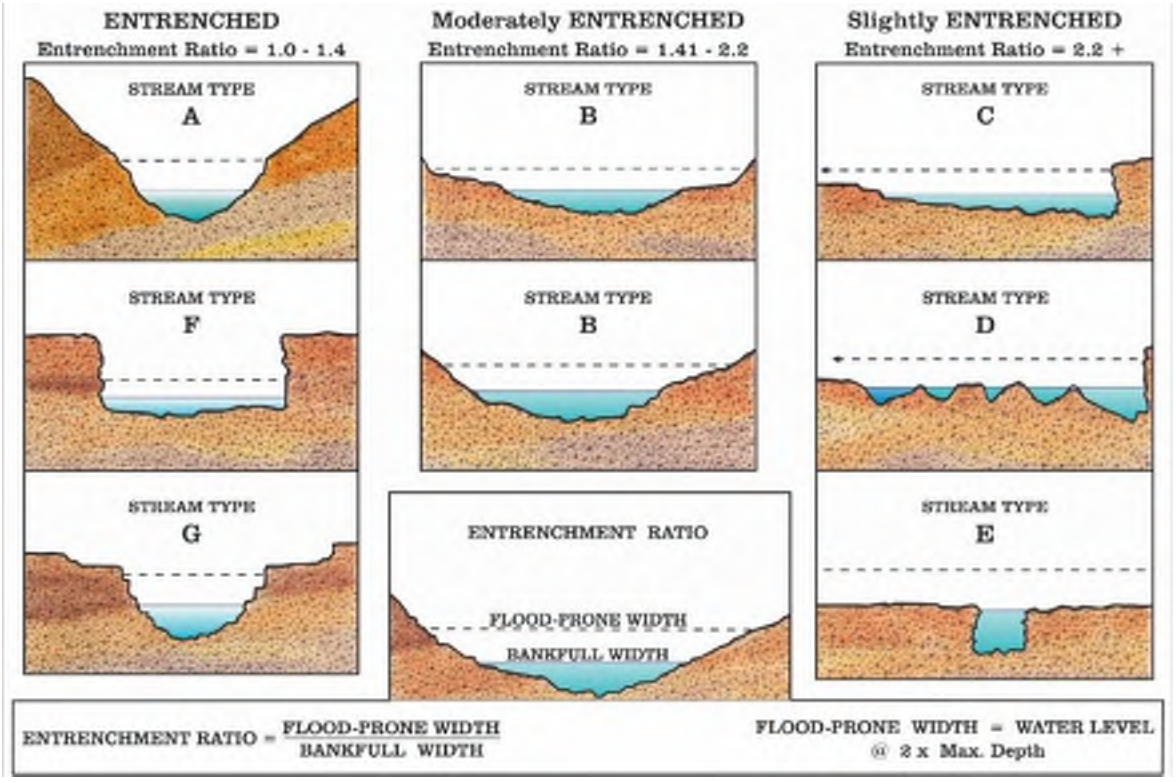

Figure 3: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 11 - CROSSING STRUCTURE HYDRAULICS		
	Existing	**Proposed**
100 year flood stage elevation at inlet:		
Flow velocity at outlet in feet per second (FPS):		
Calculated 100 year peak discharge (Q) for the *proposed* structure in CFS:		
Calculated 50 year peak discharge (Q) for the *proposed* structure in CFS:		
SECTION 12 - CROSSING STRUCTURE OPENNESS RATIO *For **tier 2**, **tier 3** and **tier 4** crossings only.*		
Crossing Structure Openness Ratio* = 0.05 * Openness box culvert = (height x width)/length Openness round culvert = (3.14 x radius^2)/length		

SECTION 13 - GENERAL DESIGN CONSIDERATIONS

Env-Wt 904.01 requires all stream crossings to be designed and constructed according to the following requirements. Check each box if the project meets these general design considerations.

All stream crossings shall be designed and constructed so as to:

- ☐ Not be a barrier to sediment transport.
- ☐ Prevent the restriction of high flows and maintain existing low flows.
- ☐ Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction.
- ☐ Not cause an increase in the frequency of flooding or overtopping of banks.
- ☐ Maintain or enhance geomorphic compatibility by:
  a. Minimizing the potential for inlet obstruction by sediment, wood, or debris, and
  b. Preserving the natural alignment of the stream channel.
- ☐ Preserve watercourse connectivity where it currently exists.
- ☐ Restore watercourse connectivity where:
  a. Connectivity previously was disrupted as a result of human activity(ies), and
  b. Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both.
- ☐ Not cause erosion, aggradation, or scouring upstream or downstream of the crossing.
- ☐ Not cause water quality degradation.

SECTION 14 - TIER-SPECIFIC DESIGN CRITERIA

Stream crossings must be designed in accordance with the tier specific design criteria listed in Part Env-Wt 904.

- ☐ The proposed project meets the tier specific design criteria listed in Part Env-Wt 904 and each requirement has been addressed in the plans and as part of the wetland application.

SECTION 15 - ALTERNATIVE DESIGN

NOTE: If the proposed crossing does not meet all of the general design considerations, the tier specific design criteria, or the minimum entrenchment ratio for each given stream type listed in **Figure 3**, then an alternative design plan and associated requirements must be addressed pursuant to Env-Wt 904.10.

- ☐ I have submitted an alternative design and addressed each requirement listed in Env-Wt 904.10.

WETLANDS PERMIT APPLICATION
STREAM CROSSING WORKSHEET
Water Division/Land Resources Management
Wetlands Bureau

RSA/Rule RSA 482-A/ Env-Wt-900

This worksheet can be used to accompany Wetlands Permit Applications when proposing stream crossings.

SECTION 1 - TIER CLASSIFICATIONS

Determine the contributing watershed size at USGS StreamStats.

Note: Plans for tier 2 and 3 crossings shall be designed and stamped by a professional engineer who is licensed under RSA 310-A to practice in New Hampshire.

Size of contributing watershed at the crossing location: 80 acres

☒ **Tier 1**: A tier 1 stream crossing is a crossing located on a watercourse where the contributing watershed size is less than or equal to 200 acres.

☐ **Tier 2**: A tier 2 stream crossing is a crossing located on a watercourse where the contributing watershed size is greater than 200 acres and less than 640 acres.

☐ **Tier 3**: A tier 3 stream crossing is a crossing that meets **any** of the following criteria:

- ☐ On a watercourse where the contributing watershed is more than 640 acres.
- ☐ Within a designated river corridor unless:
  - a. The crossing would be a tier 1 stream based on contributing watershed size, or
  - b. The structure does not create a direct surface water connection to the designated river as depicted on the national hydrography dataset as found on GRANIT.
- ☐ Within a 100-year floodplain (see Section 2 below).
- ☐ In a jurisdictional area having any protected species or habitat (NHB DataCheck).
- ☐ In a prime wetland or within a duly-established 100-foot buffer, unless a waiver has been granted pursuant to RSA 482-A:11, IV(b) and Env-Wt 706. Review the Wetlands Permit Planning Tool (WPPT) for town prime wetland and prime wetland buffer maps to determine if your project is within these areas.

☐ **Tier 4**: A tier 4 stream crossing is a crossing located on a tidal watercourse.

SECTION 2 - 100-YEAR FLOODPLAIN

Use the FEMA Map Service Center to determine if the crossing is located within a 100-year floodplain. Please answer the questions below:

☒ **No**: The proposed stream crossing *is not* within the FEMA 100-year floodplain.

☐ **Yes**: The proposed project *is* within the FEMA 100-year floodplain. Zone = _____

Elevation of the 100-year floodplain at the inlet: _____ feet (FEMA El. or Modeled El.)

SECTION 3 - CALCULATING PEAK DISCHARGE

Existing 100-year peak discharge (Q) calculated in cubic feet per second (CFS): _____ CFS	Calculation method: _____
Estimated bankfull discharge at the crossing location: _____ CFS	Calculation method: _____

➡ ***Note: If tier 1, then skip to Section 10*** ⬅

SECTION 4 - PREDICTED CHANNEL GEOMETRY BASED ON REGIONAL HYDRAULIC CURVES *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Bankfull Width: 4.5 feet	Mean Bankfull Depth: 0.7 feet
Bankfull Cross Sectional Area: 3.3 square feet (SF)	

SECTION 5 - CROSS SECTIONAL CHANNEL GEOMETRY: MEASUREMENTS OF THE EXISTING STREAM WITHIN A REFERENCE REACH *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Describe the reference reach location: Forrested reach ~255' upstream of crossing's inlet
Reference reach watershed size: 80 acres

Parameter	**Cross Section 1** Describe bed form riffle (*e.g. pool, riffle, glide*)	**Cross Section 2** Describe bed form pool (*e.g. pool, riffle, glide*)	**Cross Section 3** Describe bed form run/glide (*e.g. pool, riffle, glide*)	**Range**
Bankfull Width	5.2 feet	6.1 feet	7.4 feet	5.2-7.4 2.2 feet
Bankfull Cross Sectional Area	2.7 SF	6.8 SF	3.9 SF	2.7-6.8 4.1 SF
Mean Bankfull Depth	0.54 feet	1.13 feet	0.56 feet	0.54-1.13 0.59 feet
Width to Depth Ratio	9.63	5.38	13.28	5.38-13.28 7.9
Max Bankfull Depth	0.6 feet	1.6 feet	0.9 feet	0.6-1.6 1.0 feet
Flood Prone Width	5.7 feet	12 feet	40 feet	5.7-40 34.3 feet
Entrenchment Ratio	1.1	1.97	5.41	1.1-5.41 4.31

*Use **Figure 1** below to determine the measurements of the Reference Reach Attributes*

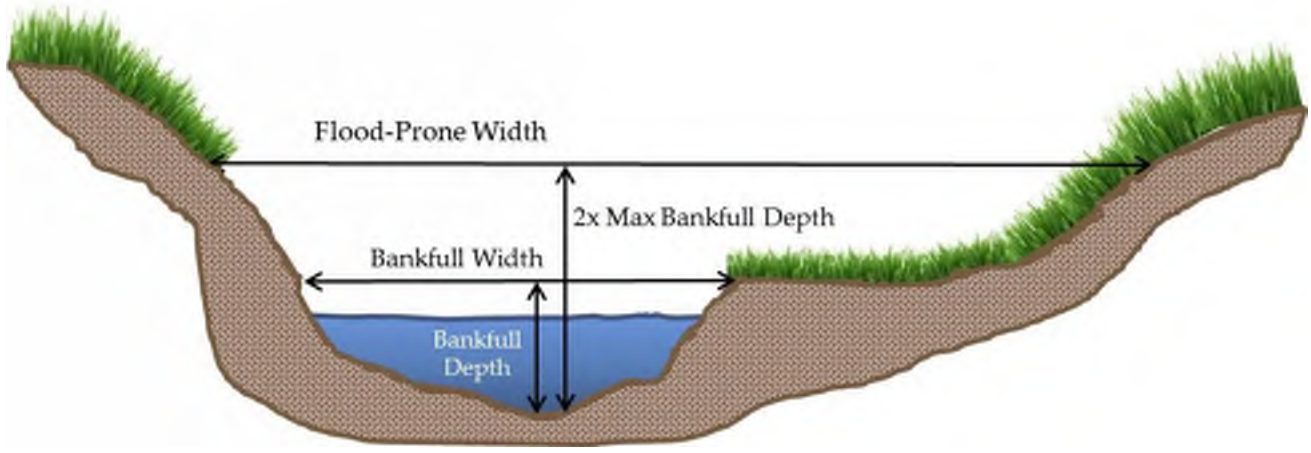

Figure 1: Determining the Reference Reach Attributes.

SECTION 6 - LONGITUDINAL PARAMETERS OF THE REFERENCE REACH AND CROSSING LOCATION *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Average Channel Slope of the Reference Reach: 5%
Average Channel Slope at the Crossing Location: Unsurveyable
SECTION 7 - PLAN VIEW GEOMETRY

Note: Sinuosity is measured a distance of at least 20 times bankfull width, or 2 meander belt widths. *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Sinuosity of the Reference Reach: 1.7	
Sinuosity of the Crossing Location: 1.1	
SECTION 8 - SUBSTRATE CLASSIFICATION BASED ON FIELD OBSERVATIONS *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
% of reach that is bedrock:	**0** %
% of reach that is boulder:	**0** %
% of reach that is cobble:	**14** %
% of reach that is gravel:	**27** %
% of reach that is sand:	**58** %
% of reach that is silt:	**0** %
SECTION 9 - STREAM TYPE OF REFERENCE REACH *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Stream Type of Reference Reach:	E

*Refer to Rosgen Classification Chart (**Figure 2**) below:*

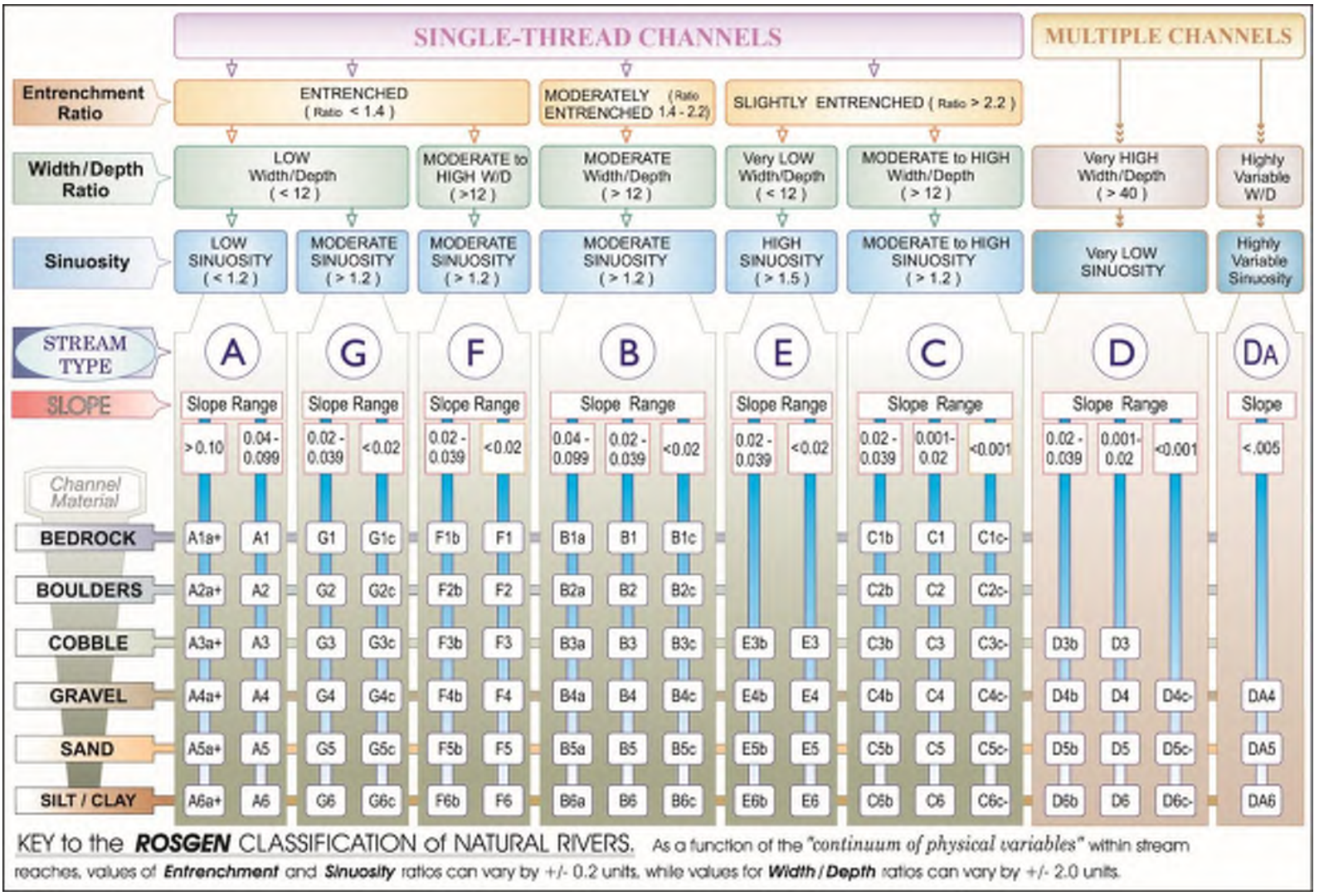

Figure 2: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 10 - CROSSING STRUCTURE METRICS					
Existing Conditions	**Existing Structure Type:** ☐ Bridge span ☐ Pipe arch ☐ Open-bottom culvert ☐ Closed-bottom culvert ☐ Closed-bottom culvert with stream simulation ☐ Other:				
	Existing Crossing Span: *(perpendicular to flow)* feet	**Culvert Diameter:** feet **Inlet Elevation:** El. feet			
	Existing Crossing Length: *(parallel to flow)* feet	**Outlet Elevation:** El. feet **Culvert Slope:**			
Proposed Conditions	**Proposed Structure Type:**	**Tier 1**	**Tier 2**	**Tier 3**	**Alternative Design**
	Bridge Span	☐	☐	☐	☐
	Pipe Arch	☐	☐		☐
	Closed-bottom Culvert	☐	☐		☐
	Open-bottom Culvert	☐	☐	☐	☐
	Closed-bottom Culvert with stream simulation	☐	☐	☐	☐
	Proposed Structure Span: feet	**Culvert Diameter:** feet			

	(perpendicular to flow)	**Inlet Elevation:** El. feet
	Proposed Structure Length: feet *(parallel to flow)*	**Outlet Elevation:** El. feet **Culvert Slope:**
	Proposed Entrenchment Ratio:* *For **Tier 2**, **Tier 3** and **Tier 4** Crossings Only. To accommodate the entrenchment ratio, floodplain drainage structures may be utilized.*	

** Note: Proposed Entrenchment Ratio must meet the minimum ratio for each stream type listed in **Figure 3**, otherwise the applicant must address the Alternative Design criteria listed in Env-Wt 904.10.*

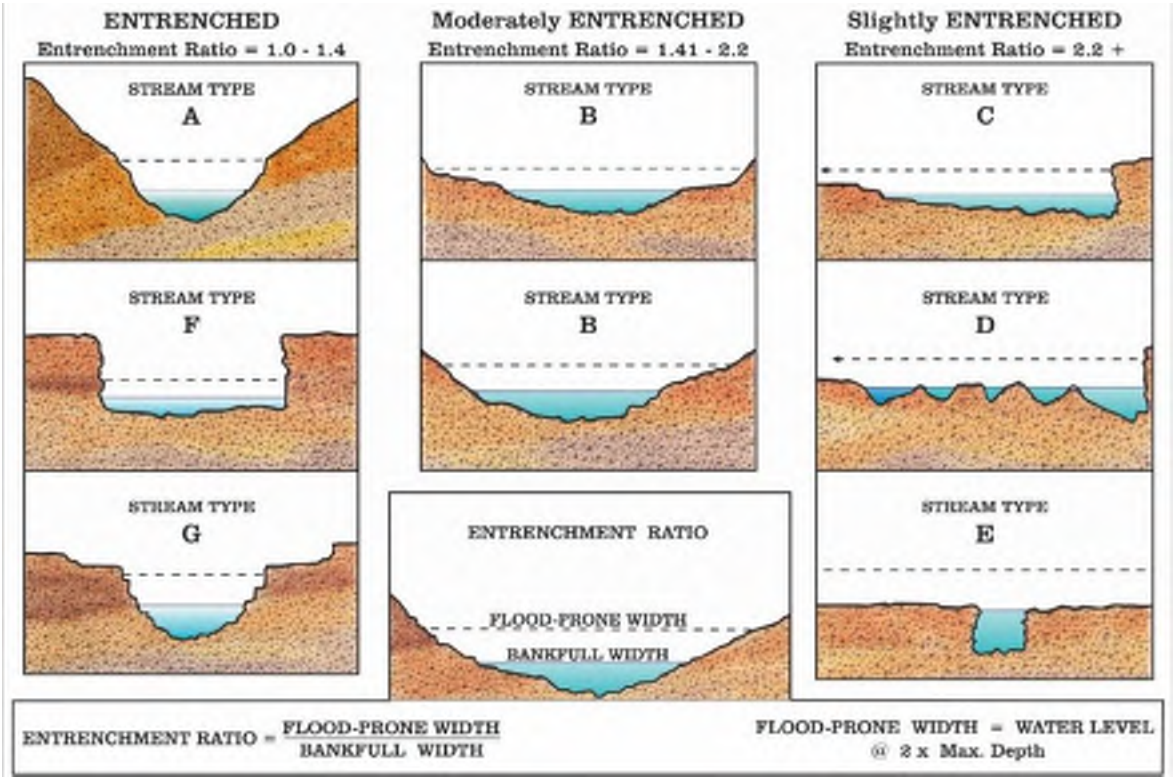

Figure 3: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 11 - CROSSING STRUCTURE HYDRAULICS		
	Existing	**Proposed**
100 year flood stage elevation at inlet:		
Flow velocity at outlet in feet per second (FPS):		
Calculated 100 year peak discharge (Q) for the *proposed* structure in CFS:		
Calculated 50 year peak discharge (Q) for the *proposed* structure in CFS:		

SECTION 12 - CROSSING STRUCTURE OPENNESS RATIO *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Crossing Structure Openness Ratio* = 0.06 * Openness box culvert = (height x width)/length Openness round culvert = (3.14 x radius^2)/length

SECTION 13 - GENERAL DESIGN CONSIDERATIONS

Env-Wt 904.01 requires all stream crossings to be designed and constructed according to the following requirements. Check each box if the project meets these general design considerations.

All stream crossings shall be designed and constructed so as to:

- ☐ Not be a barrier to sediment transport.
- ☐ Prevent the restriction of high flows and maintain existing low flows.
- ☐ Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction.
- ☐ Not cause an increase in the frequency of flooding or overtopping of banks.
- ☐ Maintain or enhance geomorphic compatibility by:
  a. Minimizing the potential for inlet obstruction by sediment, wood, or debris, and
  b. Preserving the natural alignment of the stream channel.
- ☐ Preserve watercourse connectivity where it currently exists.
- ☐ Restore watercourse connectivity where:
  a. Connectivity previously was disrupted as a result of human activity(ies), and
  b. Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both.
- ☐ Not cause erosion, aggradation, or scouring upstream or downstream of the crossing.
- ☐ Not cause water quality degradation.

SECTION 14 - TIER-SPECIFIC DESIGN CRITERIA

Stream crossings must be designed in accordance with the tier specific design criteria listed in Part Env-Wt 904.

- ☐ The proposed project meets the tier specific design criteria listed in Part Env-Wt 904 and each requirement has been addressed in the plans and as part of the wetland application.

SECTION 15 - ALTERNATIVE DESIGN

NOTE: If the proposed crossing does not meet all of the general design considerations, the tier specific design criteria, or the minimum entrenchment ratio for each given stream type listed in **Figure 3**, then an alternative design plan and associated requirements must be addressed pursuant to Env-Wt 904.10.

- ☐ I have submitted an alternative design and addressed each requirement listed in Env-Wt 904.10.

New Hampshire Natural Heritage Bureau
NHB DataCheck Results Letter

To: Melilotus Dube
7 Hazen Drive
Concord, NH 03302

From: NH Natural Heritage Bureau

Date: 11/21/2022 (This letter is valid through 11/21/2023)

Re: Review by NH Natural Heritage Bureau of request dated 11/21/2022

Permit Types: General Permit
Wetland Standard Dredge & Fill - Minor
Federal: NEPA Review

NHB ID: NHB22-3659

Applicant: Melilotus Dube

Location: Warner-Sutton
Tax Map: N/A, Tax Lot: N/A
Address: N/A

Proj. Description: Warner-Sutton 15747. Previous NHB19-2006. The proposed 4R project involves roadway rehabilitation on I89 from MM20.5-MM24.2 in the Towns of Warner and Sutton. Potential work includes resurfacing, guardrail replacement and extension, bridge maintenance efforts, drainage repairs and replacement, right-of-way fence replacement, tree clearing and rock scaling.

The NH Natural Heritage database has been checked for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government. We currently have no recorded occurrences for sensitive species near this project area.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

Based on the information submitted, no further consultation with the NH Fish and Game Department pursuant to Fis 1004 is required.

MAP OF PROJECT BOUNDARIES FOR: NHB22-3659

Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord NH 03301

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To:
Project Code: 2023-0018059
Project Name: Warner-Sutton 15747

November 22, 2022

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Please review this letter each time you request an Official Species List, we will continue to update it with additional information and links to websites may change.

About Official Species Lists

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Federal and non-Federal project proponents have responsibilities under the Act to consider effects on listed species.

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested by returning to an existing project's page in IPaC.

Endangered Species Act Project Review

Please visit the "**New England Field Office Endangered Species Project Review and Consultation**" website for step-by-step instructions on how to consider effects on listed

species and prepare and submit a project review package if necessary:

https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review

NOTE Please do not use the **Consultation Package Builder** tool in IPaC except in specific situations following coordination with our office. Please follow the project review guidance on our website instead and reference your **Project Code** in all correspondence.

Northern Long-eared Bat Update - Additionally, please note that on March 23, 2022, the Service published a proposal to reclassify the northern long-eared bat (NLEB) as endangered under the Endangered Species Act. The U.S. District Court for the District of Columbia has ordered the Service to complete a new final listing determination for the NLEB by November 2022 (Case 1:15-cv-00477, March 1, 2021). The bat, currently listed as threatened, faces extinction due to the range-wide impacts of white-nose syndrome (WNS), a deadly fungal disease affecting cave-dwelling bats across the continent. The proposed reclassification, if finalized, would remove the current 4(d) rule for the NLEB, as these rules may be applied only to threatened species. Depending on the type of effects a project has on NLEB, the change in the species' status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective (anticipated to occur by December 30, 2022). If your project may result in incidental take of NLEB after the new listing goes into effect this will first need to be addressed in an updated consultation that includes an Incidental Take Statement. If your project may require re-initiation of consultation, please contact our office for additional guidance.

Additional Info About Section 7 of the Act
Under section 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether projects may affect threatened and endangered species and/or designated critical habitat. If a Federal agency, or its non-Federal representative, determines that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Federal agency also may need to consider proposed species and proposed critical habitat in the consultation. 50 CFR 402.14(c)(1) specifies the information required for consultation under the Act regardless of the format of the evaluation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/service/section-7-consultations

In addition to consultation requirements under Section 7(a)(2) of the ESA, please note that under sections 7(a)(1) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Please contact NEFO if you would like more information.

Candidate species that appear on the enclosed species list have no current protections under the

ESA. The species' occurrence on an official species list does not convey a requirement to consider impacts to this species as you would a proposed, threatened, or endangered species. The ESA does not provide for interagency consultations on candidate species under section 7, however, the Service recommends that all project proponents incorporate measures into projects to benefit candidate species and their habitats wherever possible.

Migratory Birds

In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see:

https://www.fws.gov/program/migratory-bird-permit

https://www.fws.gov/library/collections/bald-and-golden-eagle-management

Please feel free to contact us at **newengland@fws.gov** with your **Project Code** in the subject line if you need more information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat.

Attachment(s): Official Species List

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

Project Summary

Project Code: 2023-0018059
Project Name: Warner-Sutton 15747
Project Type: Road/Hwy - Maintenance/Modification
Project Description: The proposed project is a 4R roadway rehabilitation project on Interstate 89 northbound and southbound from MM20.5 to MM24.2. Potential work will include resurfacing, drainage repairs and replacements, guardrail replacements and extension, rock scaling, tree clearing, right-of-way fence replacement and sign upgrades.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@43.30962998855682,-71.84537690021617,14z

Counties: Merrimack County, New Hampshire

Endangered Species Act Species

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Small Whorled Pogonia *Isotria medeoloides* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1890	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPaC User Contact Information

Agency: New Hampshire Department of Transportation
Name: Melilotus Dube
Address: NH Department of Transportation
Address Line 2: 7 Hazen Drive
City: Concord
State: NH
Zip: 03302
Email melilotus.m.dube@dot.nh.gov
Phone: 6032713226

Lead Agency Contact Information

Lead Agency: Federal Highway Administration

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To:
Project code: 2023-0018059
Project Name: Warner-Sutton 15747

November 23, 2022

Subject: Consistency letter for the 'Warner-Sutton 15747' project under the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat.

To whom it may concern:

The U.S. Fish and Wildlife Service (Service) has received your request dated November 23, 2022 to verify that the **Warner-Sutton 15747** (Proposed Action) may rely on the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (PBO) to satisfy requirements under Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 *et seq.*).

Based on the information you provided (Project Description shown below), you have determined that the Proposed Action is within the scope and adheres to the criteria of the PBO, including the adoption of applicable avoidance and minimization measures, and may affect, and is likely to adversely affect the endangered Indiana bat (*Myotis sodalis*) and/or the threatened Northern long-eared bat (*Myotis septentrionalis*). Consultation with the Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) is required.

This "may affect - likely to adversely affect" determination becomes effective when the lead Federal action agency or designated non-federal representative requests the Service rely on the PBO to satisfy the agency's consultation requirements for this project. Please provide this consistency letter to the lead Federal action agency or its designated non-federal representative for review, and as the agency deems appropriate, transmit to this Service Office for verification that the project is consistent with the PBO.

This Service Office will respond by letter to the requesting Federal action agency or designated non-federal representative within 30 calendar days after receiving request for verification to:

- verify that the Proposed Action is consistent with the scope of actions covered under the PBO;
- verify that all applicable avoidance, minimization, and compensation measures are included in the action proposal;
- identify any action-specific monitoring and reporting requirements, consistent with the monitoring and reporting requirements of the PBO, and
- identify anticipated incidental take.

ESA Section 7 compliance for this Proposed Action is not complete until the Federal action agency or its designated non-federal representative receives a verification letter from the Service.

If the Proposed Action is modified, or new information reveals that it may affect the Indiana bat and/or Northern long-eared bat in a manner or to an extent not considered in the PBO, further review to conclude the requirements of ESA Section 7(a)(2) may be required.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities: If your initial bridge/culvert or structure assessments failed to detect Indiana bats, but you later detect bats prior to, or during construction, please submit the Post Assessment Discovery of Bats at Bridge/Culvert or Structure Form (User Guide Appendix E) to this Service Office. In these instances, potential incidental take of Indiana bats may be exempted provided that the take is reported to the Service.

If the Proposed Action may affect any other federally-listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Office is required. If the proposed action has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency accordingly.

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Candidate
- Small Whorled Pogonia *Isotria medeoloides* Threatened

Project Description

The following project name and description was collected in IPaC as part of the endangered species review process.

Name

Warner-Sutton 15747

Description

The proposed project is a 4R roadway rehabilitation project on Interstate 89 northbound and southbound from MM20.5 to MM24.2. Potential work will include resurfacing, drainage repairs and replacements, guardrail replacements and extension, rock scaling, tree clearing, right-of-way fence replacement and sign upgrades.

Determination Key Result

Based on your answers provided, this project is likely to adversely affect the endangered Indiana bat and/or the threatened Northern long-eared bat. Therefore, consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required. However, also based on your answers provided, this project may rely on the conclusion and Incidental Take Statement provided in the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat.

Qualification Interview

1. Is the project within the range of the Indiana bat[1]?

   [1] See Indiana bat species profile

   Automatically answered
   No

2. Is the project within the range of the Northern long-eared bat[1]?

   [1] See Northern long-eared bat species profile

   Automatically answered
   Yes

3. Which Federal Agency is the lead for the action?

   A) Federal Highway Administration (FHWA)

4. Are *all* project activities limited to non-construction[1] activities only? (examples of non-construction activities include: bridge/abandoned structure assessments, surveys, planning and technical studies, property inspections, and property sales)

   [1] Construction refers to activities involving ground disturbance, percussive noise, and/or lighting.

   No

5. Does the project include *any* activities that are **greater than** 300 feet from existing road/rail surfaces[1]?

   [1] Road surface is defined as the actively used [e.g. motorized vehicles] driving surface and shoulders [may be pavement, gravel, etc.] and rail surface is defined as the edge of the actively used rail ballast.

   No

6. Does the project include *any* activities **within** 0.5 miles of a known Indiana bat and/or NLEB hibernaculum[1]?

   [1] For the purpose of this consultation, a hibernaculum is a site, most often a cave or mine, where bats hibernate during the winter (see suitable habitat), but could also include bridges and structures if bats are found to be hibernating there during the winter.

   No

7. Is the project located **within** a karst area?

   No

8. Is there *any* suitable[1] summer habitat for Indiana Bat or NLEB **within** the project action area[2]? (includes any trees suitable for maternity, roosting, foraging, or travelling habitat)

   [1] See the Service's summer survey guidance for our current definitions of suitable habitat.

   [2] The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR Section 402.02). Further clarification is provided by the User's Guide for the Range-wide Programmatic Consultation for Indiana Bat and Northern Long-eared Bat.

   Yes

9. Will the project remove *any* suitable summer habitat[1] and/or remove/trim any existing trees **within** suitable summer habitat?

   [1] See the Service's summer survey guidance for our current definitions of suitable habitat.

   Yes

10. Will the project clear more than 20 acres of suitable habitat per 5-mile section of road/rail?

    No

11. Have presence/probable absence (P/A) summer surveys[1][2] been conducted[3][4] **within** the suitable habitat located within your project action area?

    [1] See the Service's summer survey guidance for our current definitions of suitable habitat.

    [2] Presence/probable absence summer surveys conducted within the fall swarming/spring emergence home range of a documented Indiana bat hibernaculum (contact local Service Field Office for appropriate distance from hibernacula) that result in a negative finding requires additional consultation with the local Service Field Office to determine if clearing of forested habitat is appropriate and/or if seasonal clearing restrictions are needed to avoid and minimize potential adverse effects on fall swarming and spring emerging Indiana bats.

    [3] For projects within the range of either the Indiana bat or NLEB in which suitable habitat is present, and no bat surveys have been conducted, the transportation agency will assume presence of the appropriate species. This assumption of presence should be based upon the presence of suitable habitat and the capability of bats to occupy it because of their mobility.

    [4] Negative presence/probable absence survey results obtained using the summer survey guidance are valid for a minimum of two years from the completion of the survey unless new information (e.g., other nearby surveys) suggest otherwise.

    No

12. Does the project include activities **within documented NLEB habitat**[1][2]?

    [1] Documented roosting or foraging habitat – for the purposes of this consultation, we are considering documented habitat as that where Indiana bats and/or NLEB have actually been captured and tracked using (1) radio telemetry to roosts; (2) radio telemetry biangulation/triangulation to estimate foraging areas; or (3) foraging areas with repeated use documented using acoustics. Documented roosting habitat is also considered as suitable summer habitat within 0.25 miles of documented roosts.)

    [2] For the purposes of this key, we are considering documented corridors as that where Indiana bats and/or NLEB have actually been captured and tracked to using (1) radio telemetry; or (2) treed corridors located directly between documented roosting and foraging habitat.

    No

13. Will the removal or trimming of habitat or trees occur **within** suitable but **undocumented NLEB** roosting/foraging habitat or travel corridors?

    Yes

14. What time of year will the removal or trimming of habitat or trees **within** suitable but **undocumented NLEB** roosting/foraging habitat or travel corridors occur?

    A) During the active season

15. Will *any* tree trimming or removal occur **within** 100 feet of existing road/rail surfaces?

    Yes

16. Will **more than** 10 trees be removed **between** 0-100 feet of the road/rail surface *during* the active season[1]?

    [1] Areas containing more than 10 trees will be assessed by the local Service Field Office on a case-by-case basis with the project proponent.

    Yes

17. Will *any* tree trimming or removal occur **between** 100-300 feet of existing road/rail surfaces?

    Yes

18. Are *all* trees that are being removed clearly demarcated?

    Yes

19. Will the removal of habitat or the removal/trimming of trees involve the use of **temporary** lighting?

    No

20. Will the removal of habitat or the removal/trimming of trees include installing new or replacing existing **permanent** lighting?

    No

21. Does the project include wetland or stream protection activities associated with compensatory wetland mitigation?

    No

22. Does the project include slash pile burning?

    No

23. Does the project include *any* bridge removal, replacement, and/or maintenance activities (e.g., any bridge repair, retrofit, maintenance, and/or rehabilitation work)?

    No

24. Does the project include the removal, replacement, and/or maintenance of *any* structure other than a bridge? (e.g., rest areas, offices, sheds, outbuildings, barns, parking garages, etc.)

    No

25. Will the project involve the use of **temporary** lighting *during* the active season?

    Yes

26. Is there *any* suitable habitat **within** 1,000 feet of the location(s) where **temporary** lighting will be used?

    Yes

27. Will the project install new or replace existing **permanent** lighting?

    No

28. Does the project include percussives or other activities (**not including tree removal/ trimming or bridge/structure work**) that will increase noise levels above existing traffic/ background levels?

    Yes

29. Will the activities that use percussives (**not including tree removal/trimming or bridge/ structure work**) and/or increase noise levels above existing traffic/background levels be conducted *during* the active season[1]?

    [1] Coordinate with the local Service Field Office for appropriate dates.

    Yes

30. Will *any* activities that use percussives (**not including tree removal/trimming or bridge/ structure work**) and/or increase noise levels above existing traffic/background levels be conducted *during* the inactive season[1]?

    [1] Coordinate with the local Service Field Office for appropriate dates.

    No

31. Are *all* project activities that are **not associated with** habitat removal, tree removal/ trimming, bridge and/or structure activities, temporary or permanent lighting, or use of percussives, limited to actions that DO NOT cause any additional stressors to the bat species?

    Examples: lining roadways, unlighted signage , rail road crossing signals, signal lighting, and minor road repair such as asphalt fill of potholes, etc.

    Yes

32. Will the project raise the road profile **above the tree canopy**?

    No

33. Are the project activities that use percussives (not including tree removal/trimming or bridge/structure work) consistent with a Not Likely to Adversely Affect determination in this key?

    Automatically answered
    Yes, because the activities are within 300 feet of the existing road/rail surface, greater than 0.5 miles from a hibernacula, and conducted during the active season within undocumented habitat.

34. Are the project activities that are not associated with habitat removal, tree removal/ trimming, bridge and/or structure activities, temporary or permanent lighting, or use of percussives consistent with a No Effect determination in this key?

    Automatically answered
    Yes, other project activities are limited to actions that DO NOT cause any additional stressors to the bat species as described in the BA/BO

35. Is the habitat removal portion of this project consistent with a Likely to Adversely Affect determination in this key?

    Automatically answered
    Yes, because tree removal that occurs within the NLEB's active season occurs greater than 0.5 miles from the nearest hibernaculum, is less than 100 feet from the existing road/rail surface, and is not in documented NLEB roosting/foraging habitat or travel corridors, and a visual emergence survey has not been conducted

36. Is the habitat removal portion of this project consistent with a Likely to Adversely Affect determination in this key?

    Automatically answered
    Yes, because tree removal that occurs within the NLEB's active season occurs greater than 0.5 miles from the nearest hibernaculum, is 100-300 feet from the existing road/rail surface and is not in documented NLEB roosting/foraging habitat or travel corridors.

37. **General AMM 1**
    Will the project ensure *all* operators, employees, and contractors working in areas of known or presumed bat habitat are aware of *all* FHWA/FRA/FTA (Transportation Agencies) environmental commitments, including all applicable Avoidance and Minimization Measures?

    Yes

38. **Tree Removal AMM 1**
    Can *all* phases/aspects of the project (e.g., temporary work areas, alignments) be modified, to the extent practicable, to avoid tree removal[1] in excess of what is required to implement the project safely?

    Note: Tree Removal AMM 1 is a minimization measure, the full implementation of which may not always be practicable. Projects may still be NLAA as long as Tree Removal AMMs 2, 3, and 4 are implemented and LAA as long as Tree Removal AMMs 3, 5, 6, and 7 are implemented.

    [1] The word “trees” as used in the AMMs refers to trees that are suitable habitat for each species within their range. See the USFWS’ current summer survey guidance for our latest definitions of suitable habitat.

    Yes
39. **Tree Removal AMM 3**
    Can tree removal be limited to that specified in project plans and ensure that contractors understand clearing limits and how they are marked in the field (e.g., install bright colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits)?

    Yes
40. **Lighting AMM 1**
    Will *all* **temporary** lighting be directed away from suitable habitat during the active season?

    Yes
41. For Indiana bat, if applicable, compensatory mitigation measures are required to offset adverse effects on the species (see Section 2.10 of the BA). Please select the mechanism in which compensatory mitigation will be implemented:

    6. Not Applicable

Project Questionnaire

1. Have you made a No Effect determination for *all* other species indicated on the FWS IPaC generated species list?

   Yes
2. Have you made a May Affect determination for *any* other species on the FWS IPaC generated species list?

   No
3. How many acres[1] of trees are proposed for removal between 0-100 feet of the existing road/rail surface?

   [1] If described as number of trees, multiply by 0.09 to convert to acreage and enter that number.

   9.46
4. How many acres[1] of trees are proposed for removal between 100-300 feet of the existing road/rail surface?

   [1] If described as number of trees, multiply by 0.09 to convert to acreage and enter that number.

0.004

5. **Please verify:**
   All tree removal will occur greater than 0.5 mile from any hibernaculum.

   Yes, I verify that all tree removal will occur greater than 0.5 miles from any hibernaculum.
6. Is the project location 0-100 feet from the edge of existing road/rail surface?

   Yes
7. Is the project location 100-300 feet from the edge of existing road/rail surface?

   Yes
8. **Please verify:**
   No documented NLEB roosts or surrounding summer habitat within 150 feet of documented roosts will be impacted between June 1 and July 31.

   Yes, I verify that no documented NLEB roosts or surrounding summer habitat within 150 feet of documented roosts will be impacted during this period.
9. You have indicated that the following Avoidance and Minimization Measures (AMMs) will be implemented as part of the proposed project:
   - *Tree Removal AMM 1*
   - *Lighting AMM 1*
   - *Tree Removal AMM 3*
   - *General AMM 1*

Avoidance And Minimization Measures (AMMs)

This determination key result includes the committment to implement the following Avoidance and Minimization Measures (AMMs):

TREE REMOVAL AMM 1

Modify all phases/aspects of the project (e.g., temporary work areas, alignments) to avoid tree removal.

LIGHTING AMM 1

Direct temporary lighting away from suitable habitat during the active season.

TREE REMOVAL AMM 3

Ensure tree removal is limited to that specified in project plans and ensure that contractors understand clearing limits and how they are marked in the field (e.g., install bright colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits).

GENERAL AMM 1

Ensure all operators, employees, and contractors working in areas of known or presumed bat habitat are aware of all FHWA/FRA/FTA (Transportation Agencies) environmental commitments, including all applicable AMMs.

Determination Key Description: FHWA, FRA, FTA Programmatic Consultation For Transportation Projects Affecting NLEB Or Indiana Bat

This key was last updated in IPaC on October 11, 2022. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) for the endangered **Indiana bat** (*Myotis sodalis*) and the threatened **Northern long-eared bat** (NLEB) (*Myotis septentrionalis*).

This decision key should only be used to verify project applicability with the Service's February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects. The programmatic biological opinion covers limited transportation activities that may affect either bat species, and addresses situations that are both likely and not likely to adversely affect either bat species. This decision key will assist in identifying the effect of a specific project/activity and applicability of the programmatic consultation. The programmatic biological opinion is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic biological opinion, or that may affect ESA-listed species other than the Indiana bat or NLEB, or any designated critical habitat, may require additional ESA Section 7 consultation.

IPaC User Contact Information

Agency: New Hampshire Department of Transportation
Name: Melilotus Dube
Address: NH Department of Transportation
Address Line 2: 7 Hazen Drive
City: Concord
State: NH
Zip: 03302
Email melilotus.m.dube@dot.nh.gov
Phone: 6032713226

Lead Agency Contact Information

Lead Agency: Federal Highway Administration

Town of Warner, New Hampshire
Conservation Commission

Melilotus M. Dube
Environmental Manager
NH Department of Transportation
Bureau of Environment
7 Hazen Drive
Concord, NH 03301

September 5, 2019

Dear Ms. Dube:

In response to your letter of June 26, 2019, the Warner Conservation Commission would like to respond to some of the questions outlined in your letter dated June 26, 2019 regarding project # 40512, the rehabilitation of I-89, from MM20.5 extending northerly 3.7 miles to MM24.2 in the Town of Sutton.

Question1 regarding Warner's Top 10 Priority List for mitigation efforts: Warner Has already submitted the town's priorities for mitigation efforts.

Question 2 regarding existing or proposed community or regional plans bearing on this project: There are none

Question 3 regarding natural resources of significance in the vicinity of the project: We note that The NH Wildlife Action Plan identifies the area between I-89 and North Rd. as the highest ranked habitat in New Hampshire associated with two tributaries to Stevens Brook. Both Meadow Brook and French's Brook support wild trout populations before they flow into Stevens Brook. The area also provides a wildlife corridor from Mount Kearsarge to Stevens Brook. Farmland of local and statewide importance is mapped along Stevens Brook and North Road, which are in the vicinity of the project area. (source: NH Granit online mapping) Warner does not possess a great deal of prime farmland; there for it is important to encourage and protect the use of favorable and available farmland soils wherever possible. (Warner Master Plan 2011.)

Question 5 regarding parks, recreation areas, etc.: Within the Town of Warner, the project area is adjacent to the Warner Town Forest. Along with the Kearsarge State Forest and Kearsarge Gore Farm conservation land, the Warner Town Forest creates a large contiguous forested block, an important wildlife corridor between the peak of Mount Kearsarge and the Warner River. The Warner Town Forest, managed by the Chandler Reservation Board of Directors, is recreational land open for public use. Land and Community Heritage Investment Funds (LCHIP) have been used to conserve the Kearsarge Gore Farm.

Question 6 regarding water resources: Portions of the project area are immediately adjacent to the stratified drift groundwater aquifer, which is a regionally important water supply and the source of

Town of Warner drinking water. The stratified drift aquifer underlies Stevens Brook which flows immediately east of the project area and is interconnected with the stratified drift aquifer underlying the Warner River valley. The Town of Warner wellhead protection area/radius begins immediately south of the project area, near the confluence of the Warner River and Stevens Brook.

Question 7 regarding water quality concerns: Portions of the project area are immediately adjacent to the stratified drift groundwater aquifer, which is a regionally important water supply and the source of Town of Warner drinking water. The stratified drift aquifer underlies Stevens Brook which flows immediately east of the project area and is interconnected with the stratified drift aquifer underlying the Warner River valley. The Town of Warner wellhead protection area/radius begins immediately south of the project area, near the confluence of the Warner River and Stevens Brook. Protection of the water in Stevens Brook flowing to the wellhead radius area is a top priority of the town.

Question 8 regarding the presence of hazardous materials or contaminants in the vicinity of the project: There are none.

Question 9 regarding any environmental concerns not previously noted: There are no additional environmental concerns.

Question 10 regarding the project's potential significant impact on the surrounding area. The Warner Conservation Commission does not anticipate significant impact on the surrounding area.

Question 11 regarding the presence of existing roadside populations of invasive species: Ken Cogswell, conservation commission member and former DOT employee, and I attended the SWIPP pre-construction meeting for the I-89 project. We expressed our concerns about the spread of invasive species by road construction activity in the area of the highway apron. The crew acknowledged our concerns.

The Warner Conservation Commission appreciates the attention that NH DOT is giving to the careful selection of trees for removal on the project and for the minimal amount of rock scaling that will be done. Coordination with NH Fish and Game to design the fish weir for the stream crossing has so far been more than we could have anticipated. We look forward to similar cooperation between our town and state agencies in the future.

Sincerely

Nancy Martin, Chair
Warner Conservation Commission

Section 106 Programmatic Agreement – Cultural Resources Review Effect Finding

Appendix B Certification – Activities with Minimal Potential to Cause Effects

Date Reviewed: (Desktop or Field Review Date)	1/6/2023		
Project Name:	Warner-Sutton		
State Number:	15747	**FHWA Number:**	X-A000(942)
Environmental Contact:	Melilotus Dube	**DOT Project Manager:**	Margarete Baldwin
Email Address:	Melilotus.M.Dube@dot.nh.gov		

Project Description: The proposed 4R project on Interstate 89 extends from MM20.5 in the Town of Warner northerly 3.7 miles to MM24.2 in the Town of Sutton, including both north and south barrels for the entire length of the project. The proposed work will include primarily pavement reclaim and resurfacing with a final anticipated 2" raise in profile. Additional work may include guardrail replacement and extension with new end units, rock scaling, tree clearing, right-of-way fence replacement or repair, minor bridge maintenance efforts, sign repairs, replacements or upgrades, and replacement or rehabilitation of existing drainage features including structures associated with the closed drainage system, such as underdrain, catch basins and slope pipes, as well as larger structures conveying local water resources under the highway system.

Please select the applicable activity/activities:

Highway and Roadway Improvements	
☒	1. Modernization and general highway maintenance **that may require additional highway right-of-way or easement**, including: h. removal of trees, as part of roadway improvements k. Construction of turning lanes and pockets, auxiliary lanes (e.g. truck climbing, acceleration and deceleration lanes) and shoulder widening where only placement of fill material is involved, or within an area previously disturbed by vertical and ho
☐	2. Installation of rumble strips or rumble stripes
☐	3. Installation or replacement of pole-mounted signs
☒	4. Guardrail replacement, provided any extension does not connect to a bridge older than 50 years old (unless it does already), and there is no change in access associated with the extension
Bridge and Culvert Improvements	
☒	5. Culvert replacement (excluding stone box culverts), when the culvert is less than 60" in diameter and excavation for replacement is limited to previously disturbed areas
☐	6. Bridge deck preservation and replacement, as long as no character defining features are impacted
☒	7. Non-historic bridge and culvert maintenance, renovation, or total replacement, **that may require minor additional right-of-way or easement**, including: Choose an item. Choose an item.
☐	8. Historic bridge maintenance activities within the limits of existing right-of-way, including: Choose an item. Choose an item.
☒	9. Stream and/or slope stabilization and restoration activities (including removal of debris or sediment obstructing the natural waterway, or any non-invasive action to restore natural conditions)
Bicycle and Pedestrian Improvements	
☐	10. Construction of pedestrian walkways, sidewalks, sidewalk tip-downs, small passenger shelters, and alterations to facilities or vehicles in order to make them accessible for elderly and handicapped persons

Appendix B Certification – Activities with Minimal Potential to Cause Effects

☐	11. Installation of bicycle racks
☐	12. Recreational trail construction
☐	13. Recreational trail maintenance when done on existing alignment
☐	14. Construction of bicycle lanes and shared use paths and facilities within the existing right-of-way
Railroad Improvements	
☐	15. Modernization, maintenance, and safety improvements of railroad facilities within the existing railroad or highway right-of-way, **provided no historic railroad features are impacted,** including, but not limited to: Choose an item. Choose an item.
☐	16. In-kind replacement of modern railroad features (i.e. those features that are less than 50 years old)
☐	17. Modernization/modification of railroad/roadway crossings provided that all work is undertaken within the limits of the roadway structure (edge of roadway fill to edge of roadway fill) and no associated character defining features are impacted
Other Improvements	
☐	18. Installation of Intelligent Transportation Systems
☐	19. Acquisition or renewal of scenic, conservation, habitat, or other land preservation easements where no construction will occur
☒	20. Rehabilitation or replacement of existing storm drains.
☒	21. Maintenance of stormwater treatment features and related infrastructure

Please describe how this project is applicable under Appendix B of the Programmatic Agreement.

The proposed project is located completely within the existing built roadway prism of Interstate 89 and all work will occur in previously disturbed areas consisting of roadway fill. As such, the proposed project is exempt from Section 106 review, however, if Section 106 was applicable, all work would fall within approved activities of Appendix A and B of the Section 106 Programmatic Agreement as the work is intended to repave, repair, rehabilitate, or replace existing interstate infrastructure.

Please submit this Certification Form along with the Transportation RPR, including photographs, USGS maps, design plans and as-built plans, if available, for review. Note: The RPR can be waived for in-house projects, please consult Cultural Resources Program Staff.

Coordination Efforts:

Has an RPR been submitted to NHDOT for this project?	No	NHDHR R&C # assigned?	Click here to enter text.
Please identify public outreach effort contacts; method of outreach and date:	Contact letters were sent to the town officials for Warner and Sutton, including the Historical Society. No cultural resource related comments were received.		

Finding: (To be filled out by NHDOT Cultural Resources Staff)

☒	**No Potential to Cause Effects**	☐	**No Historic Properties Affected**
This finding serves as the Section 106 Memorandum of Effect. No further coordination is necessary.			
☐	**This project does *not* comply with Appendix B. Review will continue under Stipulation VII of the Programmatic Agreement. Please contact NHDOT Cultural Resources Staff to determine next steps.**		
	NHDOT comments:		

Appendix B Certification – Activities with Minimal Potential to Cause Effects

Sheila Charles	1/6/2023
NHDOT Cultural Resources Staff	Date

Coordination of the Section 106 process should begin as early as possible in the planning phase of the project (undertaking) so as not to cause a delay.

Project sponsors should not predetermine a Section 106 finding under the assumption a project is limited to the activities listed in Appendix B until this form is signed by the NHDOT Bureau of Environment Cultural Resources Program staff.

Every project shall be coordinated with, and reviewed by the NHDOT-BOE Cultural Resources Program in accordance with the *Programmatic Agreement Among the Federal Highway Administration, the New Hampshire State Historic Preservation Office, the Army Corps of Engineers, New England District, the Advisory Council on Historic Preservation, and the New Hampshire Department of Transportation Regarding the Federal Aid Highway Program in New Hampshire*. In accordance with the Advisory Council's regulations, we will continue to consult, as appropriate, as this project proceeds.

If any portion of the project is not entirely limited to any one or a combination of the activities specified in Appendix B (with, or without the inclusion of any activities listed in Appendix A), please continue discussions with NHDOT Cultural Resources staff.

This No Potential to Cause Effect or No Historic Properties Affected project determination is your Section 106 finding, as defined in the Programmatic Agreement.

Should project plans change, please inform the NHDOT Cultural Resources staff in accordance with Stipulation VII of the Programmatic Agreement.

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New England District

Appendix B
New Hampshire General Permits
Required Information and USACE Section 404 Checklist

Required Information

In order for USACE to properly evaluate your application, applicants must submit the following information for all projects along with the NHDES Wetlands Bureau application or permit notification forms. Some projects may require more information. Check with USACE at (978) 318-8832 for project-specific requirements. For your convenience, this Appendix B is also attached to the NHDES Wetlands Bureau application and Permit by Notification forms.

- NHDES Wetlands Permit Application.
- Request for Project Review Form by the NH DHR: https://www.nh.gov/nhdhr/review/rpr.htm.
- Photographs of wetland/waterway to be impacted.
- Purpose of the project.
- Legible, reproducible plans no larger than 11”x17” with bar scale. Provide locus map and plan views of the entire property.
- Typical cross-section views of all wetland and waterway fill areas and wetland replication areas.
- In navigable waters, show MLW and MHW elevations. Show the HTL elevations when fill is involved. In other waters, show the OHW elevation.
- On each plan, show the following for the project:
  - Vertical datum and the NAVD 1988 equivalent with the vertical units as U.S. feet. In coastal waters this may be mean higher high water (MHHW), MHW, MLW, mean lower low water (MLLW) or other tidal datum with the vertical units as U.S. feet. MLLW and MHHW are preferred. Provide the correction factor detailing how the vertical datum (e.g., MLLW) was derived using the latest National Tidal Datum Epoch for that area, typically 1983 - 2001.
  - Horizontal state plane coordinates in U.S. survey feet based on the Traverse Mercator Grid system for the State of New Hampshire (Zone 2800) NAD 83.
  - Project limits with existing and proposed conditions.
  - Limits of any FNP in the vicinity of the project area and horizontal State Plane Coordinates in U.S. survey feet for the limits of the proposed work closest to the FNP.
  - Volume, type, and source of fill material to be discharged into waters and wetlands, including the area(s) (in square feet or acres) of fill in wetlands, below the OHW in inland waters and below the HTL in coastal waters.
  - Delineation of all waterways and wetlands on the project site.
- Use Federal delineation methods and include USACE wetland delineation data sheets (GC 2).
- For activities involving discharges of dredged or fill material into waters of the U.S., include a statement describing how impacts to waters of the U.S. are to be avoided and minimized, and either a statement describing how impacts to waters of the U.S. are to be compensated for (or a conceptual or detailed mitigation plan) or a statement explaining why compensatory mitigation should not be required for the proposed impacts. Please contact USACE for guidance.

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Appendix B
New Hampshire General Permits
Required Information and USACE Section 404Checklist

USACE Section 404 Checklist

1. Attach any explanations to this checklist. Lack of information could delay a USACE permit determination.
2. All references to "work" include all work associated with the project construction and operation. Work includes filling, clearing, flooding, draining, excavation, dozing, stumping, etc.
3. See GC 3 for information on single and complete projects.
4. Contact USACE at (978) 318-8832 with any questions.
5. The information requested below is generally required in the NHDES Wetland Application. See page 61 for NHDES references and Admin Rules as they relate to the information below.

1. Impaired Waters	Yes	No
1.1 Will any work occur within 1 mile upstream in the watershed of an impaired water? See the following to determine if there is an impaired water in the vicinity of your work area. * https://nhdes-surface-water-quality-assessment-site-nhdes.hub.arcgis.com/ https://www.des.nh.gov/water/rivers-and-lakes/water-quality-assessment https://www4.des.state.nh.us/onestopdatamapper/onestopmapper.aspx		x
2. Wetlands	Yes	No
2.1 Are there are streams, brooks, rivers, ponds, or lakes within 200 feet of any proposed work?	x	
2.2 Are there proposed impacts to tidal SAS, prime wetlands, or priority resource areas? Applicants may obtain information from the NH Department of Resources and Economic Development Natural Heritage Bureau (NHB) DataCheck Tool for information about resources located on the property at https://www4.des.state.nh.us/NHB-DataCheck/.		x
2.3 If wetland crossings are proposed, are they adequately designed to maintain hydrology, sediment transport & wildlife passage?	x	
2.4 Would the project remove part or all of a riparian buffer? (Riparian buffers are lands adjacent to streams where vegetation is strongly influenced by the presence of water. They are often thin lines of vegetation containing native grasses, flowers, shrubs and/or trees that line the stream banks. They are also called vegetated buffer zones.)		x
2.5 The overall project site is more than 40 acres?	x	
2.6 What is the area of the previously filled wetlands?	N/A	
2.7 What is the area of the proposed fill in wetlands?	N/A	
2.8 What % of the overall project sire will be previously and proposed filled wetlands?	N/A	
3. Wildlife	Yes	No
3.1 Has the NHB & USFWS determined that there are known occurrences of rare species, exemplary natural communities, Federal and State threatened and endangered species and habitat, in the vicinity of the proposed project? (All projects require an NHB ID number & a USFWS IPAC determination.) NHB DataCheck Tool: https://www4.des.state.nh.us/NHB-DataCheck/. USFWS IPAC website: https://ipac.ecosphere.fws.gov/		x

3.2 Would work occur in any area identified as either "Highest Ranked Habitat in N.H." or "Highest Ranked Habitat in Ecological Region"? (These areas are colored magenta and green, respectively, on NH Fish and Game's map, "2010 Highest Ranked Wildlife Habitat by Ecological Condition.") Map information can be found at: • PDF: https://wildlife.state.nh.us/wildlife/wap-high-rank.html. • Data Mapper: www.granit.unh.edu. • GIS: www.granit.unh.edu/data/downloadfreedata/category/databycategory.html.	x	
3.3 Would the project impact more than 20 acres of an undeveloped land block (upland, wetland/waterway) on the entire project site and/or on an adjoining property(s)?		x
3.4 Does the project propose more than a 10-lot residential subdivision, or a commercial or industrial development?		x
3.5 Are stream crossings designed in accordance with the GC 31?	x	
4. Flooding/Floodplain Values	Yes	No
4.1 Is the proposed project within the 100-year floodplain of an adjacent river or stream?		x
4.2 If 4.1 is yes, will compensatory flood storage be provided if the project results in a loss of flood storage?	N/A	
5. Historic/Archaeological Resources		
For a minimum, minor or major impact project - a copy of the RPR Form (www.nh.gov/nhdhr/review) with your DES file number shall be sent to the NH Division of Historical Resources as required on Page 37 GC 14(d) of the GP document**		x
6. Minimal Impact Determination (for projects that exceed 1 acre of permanent impact)	Yes	No
Projects with greater than 1 acre of permanent impact must include the following: • Functional assessment for aquatic resources in the project area. • On and off-site alternative analysis. • Provide additional information and description for how the below criteria are met.		
6.1 Will there be complete loss of aquatic resources on site?		x
6.2 Have the impacts to the aquatic resources been avoided and minimized to the greatest extent practicable?	x	
6.3 Will all aquatic resource function be lost?		x
6.4 Does the aquatic resource (s) have regional significance (watershed or ecoregion)?		x
6.5 Is there an on-site alternative with less impact?		x
6.6 Is there an off-site alternative with less impact?		x
6.7 Will there be a loss to a resource dependent species?		x
6.8 Are indirect impacts greater than 1 acre within and adjacent to the project area?		x
6.9 Does the proposed mitigation replace aquatic resource function for direct, indirect, and cumulative impacts?	x	

*Although this checklist utilizes state information, its submittal to USACE is a federal requirement.

** If your project is not within Federal jurisdiction, coordination with NH DHR is not required under Federal law.

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Appendix B
New Hampshire General Permits
Required Information and USACE Section 404 Checklist

NHDES Rule Citations

Appendix B Requirements	NHDES Citation	NHDES Resource, Form & BMP
1. Impaired Waters		
1.1	See Env-Wt 307.03 Protection of Water Quality Required & Env-Wt 306.05 a) 7	https://nhdes-surface-water-quality-assessment-site-nhdes.hub.arcgis.com/ https://www.des.nh.gov/water/rivers-and-lakes/water-quality-assessment https://www4.des.state.nh.us/onestopdatamapper/onestopmapper.aspx
2. Wetlands		
2.1	N/A	N/A
2.2	Env 307.06; Env- Wt 311.01(a)(b) (c)	NH Online Forms System - Coastal Resource Worksheet. Version 2.0 Wetlands Permitting: Protected Species and Habitat (nh.gov) Wetlands Permitting: Priority Resource Area (nh.gov) https://www4.des.state.nh.us/NHB-DataCheck/.
2.3	Env-Wt 313.03(b)(3); Env-Wt 313.03(b)4)(7); Env-Wt 307.06	See Chapter 7, Stream & Wetland Crossings: *Wetlands Best Management Practice Techniques for Avoidance and Minimiz* Wetlands-BMP-Manual-2019.pdf (neiwpcc.org) (& Env-Wt 900 for Stream Crossings)
2.4	Env-Wt 604.02 (Tidal buffer zone); Env-Wt 704 (prime buffers)	
2.5	N/A	N/A
2.6	N/A	N/A
2.7	Env-Wt 311.04(g)	Standard application Section 11- NH Online Forms System - Standard Dredge and Fill Wetlands Permit Application . Version 3.5
2.8	N/A	N/A
3. Wildlife		
3.1	Env-Wt 103.69 "Protected species or habitat"; Env-Wt 307.06, 311.01	NHB DataCheck Tool: https://www4.des.state.nh.us/NHB-DataCheck/. Wetlands Permitting: Protected Species and Habitat (nh.gov) Wetlands Permitting: Priority Resource Area (nh.gov)
3.2	Env-Wt 311.02; 313.03(b)(2), (4), (7)(16); Env-Wt 313.03(b)(6) & See Env-Wt 808.19(g), Env-Wt 808.20	Wetlands Permitting: Protected Species and Habitat (nh.gov) Wetlands Permitting: Priority Resource Area (nh.gov)
3.3	N/A	N/A
3.4	NA	N/A
3.5	(Env-Wt 900) Microsoft Word - Env-Wt 900 as of 10-2020.docx (nh.gov)	New Hampshire Stream Crossing Guidelines (nh.gov) (2009 UNH) _ NH Online Forms System - Wetland Permit Application Stream Crossing Worksheet. Version 1.8 Stream Crossing Design (nh.gov) : https://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/documents/RR_V.9_FINAL_3-14-19.pdf Best Management Practices for Routine Roadway Maintenance Activities in New Hampshire. 2019. New Hampshire Department of Transportation.
4. Flooding/Floodplain Values		
4.1	Env-Wt 311.05; Env-Wt 103.66 517.03(b); 517.06(a)(6);	Wetlands Permitting: Priority Resource Area (nh.gov) NH Online Forms System - Coastal Resource Worksheet. Version 2.0 New Hampshire Coastal Flood Risk Summary | NH Department of

	527.02(e); 527.04(d); Env-Wt 600 Env-Wt 900	Environmental Services (cited in Env-Wt 603.05) NH Online Forms System - Wetland Permit Application Stream Crossing Worksheet. Version 1.8 hydraulic-vulnerability-handout.pdf (nh.gov)
4.2	Env-Wt 527.02 & 527.04 & 313.04 & Env-Wt 800; Wt 605.03 & 605.04	Yes, for permanent impacts to a PRA, impacts from public highway projects, & those projects where flood storage functions are lost when the mitigation threshold is reached. Wetlands Mitigation | NH Department of Environmental Services
5. Historical/Archeological Resources		
5.0	Env-Wt 311.02(f)(6)	
6. Minimal Impact Determination		
6.0	F/V assessment: (Env-Wt 311.10); Env-Wt 603.04 (Coastal Functional Assessment) Alternatives: (Env-Wt 311.07(b)(2))	NH Online Forms System - Wetlands Functional Assessment Worksheet. Version 1.3 NH Online Forms System - Coastal Resource Worksheet. Version 2.0
6.1		Wetlands Permitting: Avoidance, Minimization, and Mitigation (nh.gov)
6.2	Env-Wt 102.12 (“Avoidance”), Env-Wt 102.13 (“Avoidance, minimization, mitigation”), Env-Wt 102.14 (“Avoid and minimize”), Env-Wt 311.01, Env-Wt 313.03 (“Avoidance & Minimization") Env-Wt 311.07	See *Wetlands Best Management Practice Techniques for Avoidance and Minimization* - Wetlands-BMP-Manual-2019.pdf (neiwpcc.org)referenced in Env-Wt 313.03(a); A/M written narrative (NH Online Forms System - Avoidance and Minimization Written Narrative. Version 2.0); Avoidance and Minimization Checklist: NH Online Forms System - Avoidance and Minimization Checklist. Version 3.1
6.3	Env-Wt 311.10, 603.04	See Functional Assessment worksheets above
6.4	Env-Wt 311.02, Env-Wt 312.04. Env-Wt 306.05, 307.06, 311.01	See Protected Species or Habitat (including exemplary natural communities)
6.5	Env-Wt 311.01, Env-Wt 311.07, Env-Wt 311.10 & 313.01 c)1)	See Avoidance & Minimization cites above & BMPs
6.6	(Env-Wt 313.01c) (1) & Env-Wt 311.07(b)(2))	
6.7	Env-Wt 311.10, Env-Wt 103.69, Env-307.06, see Avoidance & minimization cites	NH Online Forms System - Wetlands Functional Assessment Worksheet. Version 1.3; Wetlands Permitting: Priority Resource Area (nh.gov) NH Online Forms System - Coastal Resource Worksheet. Version 2.0
6.8	Env-Wt 102.05 (Water quality BMPs)	Practices to minimize or prevent direct or indirect discharge of sediment or other pollutants into surface waters and wetlands, listed in Env-Wt 307
6.9	Env-Wt 800	

Warner-Sutton; NHDOT Project 15747

Supplemental Narrative

Project Description

Warner-Sutton 15747 is a federally funded 4R project included in the Ten-Year Transportation Improvement Plan (TYP). The project's purpose and need is to rehabilitate the roadway to improve poor pavement surfaces, reconstruct guardrail to bring it to the current standard, replace metal closed drainage systems and rehabilitate culverts as needed.

The work will begin at MM 20.5 and extend 3.7 miles north to MM 24.2 on Interstate 89 (I-89) northbound (NB) and southbound (SB) for a total of 7.4 miles. The scope of work for this project includes full depth pavement reclaim on the I-89 mainline north and south barrels. The median shoulder will be widened from 2.5' to 4' on the NB from MM 22.0 to MM 24.2 and SB from MM 22.0 to MM 24.2. Additional work includes guardrail replacement, tree clearing for sight distance and access to drainage structures, rock scaling, minor bridge work (joint repair and paving only) and drainage improvements. The drainage structure improvements will include maintenance and repair work as needed for the proposed design and future maintenance of the structures.

The current advertising date is August 1, 2023, with the anticipated construction timeframe of Spring 2024 to Fall 2025.

Existing Conditions

Existing details shown on the Plans are from the NHDOT project survey which was concentrated around the existing pipe inlets, outlets and proposed swale locations supplemented by LIDAR contours.

Project Alternative

The purpose of the project is to update the infrastructure (pavement, drainage, and guardrail) starting at MM 20.5 and extend 3.7 miles north to MM 24.2 on Interstate 89 (I-89) northbound (NB) and southbound (SB) for a total of 7.4 miles to extend the service life of the interstate facility. The need for this is demonstrated by the deteriorated condition of the existing highway infrastructure, which has surpassed the original anticipated 30-year lifespan, and outdated or unsafe existing roadway widths, guardrail, sight distances, etc.

Alternatives to address the project's Purpose and Need included the following:

- No Build Option: If the no build option were chosen, the highway would continue to deteriorate to the point where it could impede the future function of I-89 and/or require more expensive future rehabilitation options.

- Pavement Preservation: Continue to preserve the existing infrastructure with a pavement overlay, this would not address the Purpose and Need as the existing pavement is showing thermal and wheel path fatigue cracks and adjacent drainage and guardrail is in a poor condition. Allowing the infrastructure to continue to deteriorate would require a more substantial rehabilitation effort in the future.
- 4R (resurfacing, restoration, reconstruction, or rehabilitation) Selected Alternative: This alternative rehabilitates the existing pavement through a reclaim treatment, widens shoulders where the widths are deficient, and replaces/rehabilitates ancillaries such as drainage and guardrail. This alternative meets the Purpose and Need by updating the roadway to meet current safety guidelines and extends the service life of the interstate facility.
- Full Box Reconstruction: This alternative would require extensive work to completely replace the existing roadway structure and aged infrastructure. While this would meet the Purpose and Need, this alternative is not preferred as it would be unreasonably costly and detrimental to the travelling public due to added disruptions associated with complete infrastructure replacements which are not needed in many instances when repair or rehabilitation can also mee the Purpose and Need.

Project Wetland Impacts

The project proposes impacts to several different types of wetlands and through discussion with the Natural Resource Agencies will be handled as follows:

- The project proposes no impacts to prime wetlands or surface waters under the jurisdiction of the Shoreland Water Quality Protection Act. The project limits are also **not within** the limits of a Local River Advisory designation and jurisdiction.
- As discussed at the December 21st, 2022 Natural Resource Agency Meeting, there are locations which qualify for permitting through the NHDES Certified Culvert Maintainer Program (CCMP) under Activities RR1-Culvert Replacement or Repair, RR6-Headwall Construction, Repair or Replacement and RR8- Culvert Inlet and Outlet Maintenance. CCMP locations are labeled on the plans as CCMP – DN XX.
- Impacted wetlands that do not qualify for a CCMP registration will be permitted through the NHDES Wetlands Bureau Standard Dredge and Fill Permit as a Major Impact Project. This NHDES Wetlands Bureau Standard Dredge and Fill Major Impact Project and permit includes impacts associated with tree clearing, slope work, and drainage work within wetlands jurisdiction that do not qualify under the CCMP Activities. These impacts will also qualify for coverage under the USACOE State Programmatic General Permit.

Tree Clearing: Impacts associated with tree clearing are necessary for access to the inlet or outlet of drainage structures and other work areas, as well as improved sight lines to signs.

Slope Work: Impacts associated with slope work are necessary for shoulder pavement widening of I-89 mainline, and for two construction access roads. The shoulder pavement widening will require minor widening of roadway embankments in these areas. The construction access roads are necessary for access to two culverts located at the bottom of steep wooded slopes These fill impacts are shown within this application as permanent impacts.

Drainage Work: There are several drainage structures that will require permanent and temporary impacts to jurisdictional wetlands including intermittent streams, palustrine and forested wetlands. The intermittent streams within the project are located within the same wetland system but are not directly connected. Many of them are generated from palustrine wetlands on the western side of the project. Pipes with perched conditions, whether in wetlands or streams will be corrected to the maximum extent possible based on site conditions. These impacts are shown as permanent impacts. A perch repair detail is included prior to the Wetland Impact Plan set.

- Six Culvert Locations at Tier 1 Intermittent Stream Crossings:
    - Wetland Identification #20, #25: Located at approximately MM 21.1 NB, an existing 30" reinforced concrete pipe (RCP) 186' long. The proposed work will replace both existing mortar rubble masonry (MRM) headwalls with concrete headwalls and install beaver deterrent systems with stone pads at both the inlet and outlet. The detail for the beaver deterrent system is included prior to the Wetland Impact Plan set.
    - Wetland Identification #68: Located at approximately MM 22.1 NB, an existing 24" corrugated metal pipe (CMP) 140' long. The proposed work will replace the inlet MRM headwall with a concrete headwall and shorten the culvert at the outlet by an 8' section of pipe and add a concrete headwall. The proposed work will also include ultra-violet (UV) cured-in-place-pipe (CIPP) installation and repair the existing perch at the outlet while providing rip rap protection to prevent scour from the increased velocity. This location also requires a permanent construction access road to access the outlet.
    - Wetland Identification #68: Located at approximately MM 22.2 SB, an existing 24" reinforced concrete pipe (RCP) 131' long. The proposed work includes replacing 16' of pipe at the inlet along with the replacing the existing mortar rubble masonry (MRM) headwall with a concrete headwall. The inlet channel has a mound of sediment that will be removed, and a pad of stone will be placed at the inlet. The outlet has a 3.5' perch and is in the middle of a steep slope so 50' of perch repair will be placed with a grade of 25% to match into the existing slope.
    - Wetland Identification #124: Located at approximately MM 23.7 SB, an existing 30" reinforced concrete pipe (RCP) 108' long. The proposed work will replace

the end section at the inlet and at the outlet replace the existing mortar rubble masonry (MRM) headwall with a concrete headwall. A pad of stone will be placed at the inlet between the nearby underdrain outlet and the inlet end section. The outlet will correct a 2' perch with 40' of perch repair stone with a grade of less than 5%.

  - Wetland Identification #129: Located at approximately MM 23.8 NB, an existing 36" reinforced concrete pipe (RCP) 108' long. The proposed work will repoint the mortar rubble masonry (MRM) headwall at the inlet and add a stone pad to prevent further undermining of the headwall. The proposed work at the outlet will replace the existing mortar rubble masonry (MRM) headwall with a concrete headwall. The outlet will correct a 1' perch with 20' of perch repair stone with a grade of 5%.
  - Wetland Identification #129: Located at approximately MM 23.8 SB, an existing 36" reinforced concrete pipe (RCP) 148' long. The proposed work will replace the existing mortar rubble masonry (MRM) headwalls at the inlet and at the outlet. At the inlet a stone pad will be constructed to prevent further undermining of the headwall. The outlet work will correct a 1' perch with 30' of perch repair stone with a grade of less than 5% this perch repair will be 15' wide instead of the standard 10' to prevent further scour of the stream and to stabilize the banks.

- In addition to the UV CIPP location noted above at the Tier 1 crossing, there are four other proposed UV CIPP lining locations which will include permanent wetland impacts for the construction of outlet rip rap protection at the outfalls. These impacts are with palustrine forested, emergent and scrub-shrub wetlands.
- There is one location at MM 22.5 SB that the existing condition of the outlet channel of a pipe is backed up with sediment and debris (to the crown of culvert) and will require a 70' channel reconstruction. This work will be done in palustrine forested wetland (#89) and riverine intermittent wetland (#90).
- There are numerous locations where there will be permanent impacts from replacing the existing combined perforated underdrain/storm pipes with separate underdrains and storm drain systems which will include new catch basins, headwalls (some of which will be in new locations) and stone outlet protection. These impacts will be in Palustrine Forested and Scrub-Shrub wetlands.

Other Environmental Resources

Delineations: Site photos, delineations, and stream and wetlands assessments were performed by sub-consultant Stoney Ridge Environmental, LLC (SRE). See excerpts from the Report titled Final Wetland Delineation & Invasive Species Report included elsewhere in this application.

Threatened and Endangered Species: The NH Department of Natural and Cultural Resources Natural Heritage Bureau reviewed the project area and determined that there are no known records of State or Federally protected species, or their habitats located in the vicinity of the work. The project is located within the range of the federally threatened Northern Long-Eared Bat (NLEB), and Small Whorled Pogonia. Consultation for impacts to NLEB is completed with the US Fish and Wildlife Service, who concur that the project will result in a May Affect, Likely to Adversely Affect finding for these species in accordance with the FHWA Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and NLEB. The Contractor will be required to implement all appropriate Avoidance and Minimization Measures during construction.

Water Quality: The project proposes widening as described above for the mainline shoulders. This widening creates an increase in impervious area for the project. Due to the increase in impervious area, stormwater treatment, utilizing four grass treatment swales within the median, is proposed. The treatment swales are capable of collecting and treating approximately two times the amount of new impervious surface (93%).

Invasive Species: Invasive Species were identified and delineated. Type I and Type II species are present. The project will require an Invasive Species Management Plan.

Floodplains: There are no regulatory floodways or floodplains located within the work areas.

Impaired Waters: The project is not located in the vicinity of any impaired waters.

Cultural Resources: The proposed project has been reviewed by the Department's Cultural Resource Program. Work located within existing interstate highway corridors are exempt from compliance with Section 106 of the National Historic Preservation Act, however, the Department still applies the same level of review for these projects as for projects which do require compliance. This project includes approved activities included in Appendix B of the Section 106 Programmatic Agreement and no further coordination is necessary.

Conservation Commission Coordination: The Towns of Warner and Sutton Conservation Commission were contacted by letter on June 26, 2019. A response was received including identification of wetlands and invasive species in the project area and a list of priority mitigation sites for the Towns of Warner and Sutton.

Warner-Sutton 15747 Standard Dredge and Fill Application Photos
Taken by NHDOT, Fuss & O'Neill & Google in May through June, 2022

Impact Location A: Looking north at underdrain outlet at Sta. 1134+50 NB RT in Wetland #12.

Impact Locations D, E & F: Looking at pipe inlet with beaver deterrent at Sta. 1146+90 NB Median in Wetlands #19, 20 & 21.

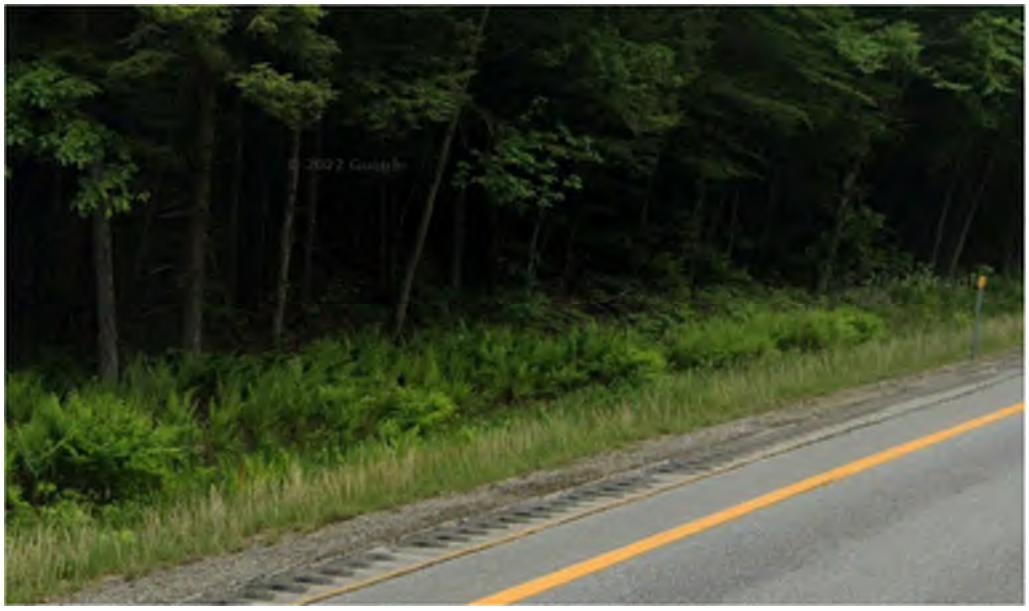
Impact Locations D, E & F: Looking east at pipe inlet with beaver deterrent at Sta. 1146+90 NB Median in Wetlands #19, 20 & 21.

Impact Locations G, H & I: Looking at pipe outlet with beaver deterrent at Sta. 1147+35 NB RT in Wetlands # 25, 26 & 27.

Impact Locations G, H & I: Looking east at pipe outlet channel at Sta. 1147+35 NB RT in Wetlands # 25, 26 & 27.

Impact Location K: Looking up the roadside ditch at Sta. 1154+00 NB RT in Wetland #47.

Impact Location L: Looking up roadside ditch at Sta. 1154+25 NB Median in Wetland #33.



Impact Locations M & N: Looking up roadside ditch at Sta. 1158+50 NB Median in Wetland #38.

Impact Location O: Looking east at pipe outlet at Sta. 1171+40 NB RT in Wetland #57.

Impact Locations S & T: Looking east from pipe outlet at Sta. 1186+40 RT in Wetlands #63 & 64.

Impact Location U: Looking north from pipe outlet at Sta. 1186+40 RT in Wetland 65.

Impact Locations Y, Z, AA & AB: Looking west at pipe inlet at Sta. 1199+75 Median in Wetlands 68, 71 & 73.

Warner-Sutton NB, 15747

Impact Location AC: Looking east from pipe outlet at Sta. 1199+75 NB RT in Wetland #76.

Impact Location AC: Looking west at pipe outlet at Sta. 1199+75 NB RT in Wetland #76.

Impact Locations AG, AI & AO: Looking up the roadside ditch at Sta. 1202+75 NB Median in Wetland # 73.

Impact Location AH: Looking west at pipe outlet at 1202+75 NB RT in Wetland #78.

Impact Location AJ: Looking west at pipe inlet at 1205+80 NB Median in Wetland # 75.

Impact Locations AM & AN: Looking east at pipe inlet at Sta. 1205+80 NB RT in Wetlands #79 & 80.

Impact Locations AU, AV & AW: Looking west at pipe inlet at Sta. 1230+75 NB Median in Wetlands # 95, 96 & 97.

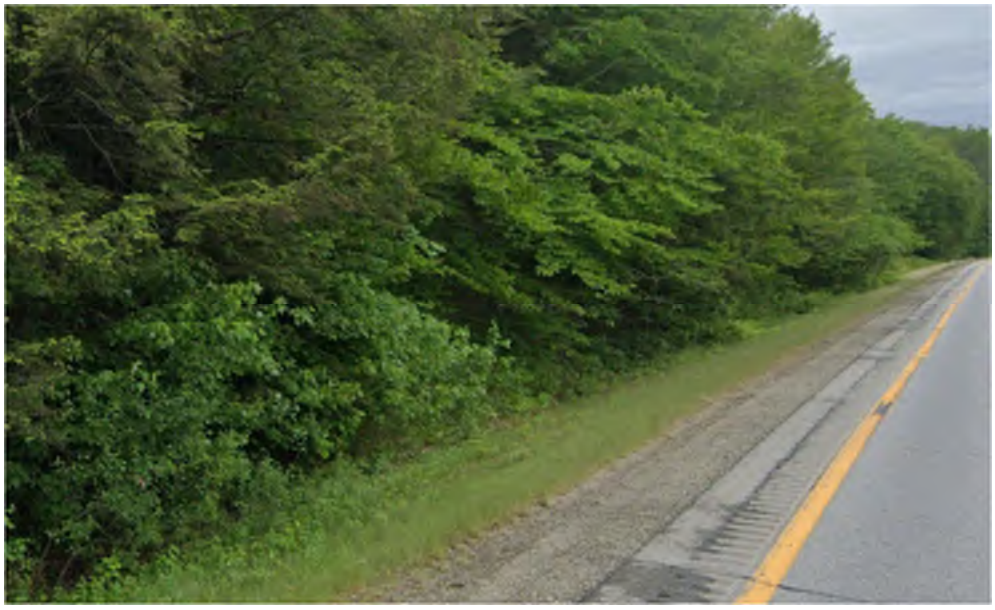
Impact Locations AX, AY & AZ: Looking east from pipe outlet at Sta. 1230+75 NB RT in Wetlands #96, 99 & 100.

Impact Locations BF & BG: Looking up the roadside ditch at Sta.1241+50 NB Median in Wetlands #102 & 103.

Impact Location BI: Looking at the access from the NB barrel in the wooded area between the SB outlet for Sta. 1256+90 and the NB inlet for Sta. 1258+75 in the Median in Wetland #110.

Impact Location BJ: Looking east from pipe inlet at Sta. 1258+75 NB RT in Wetland #115.

Impact Location BQ: Looking up the roadside ditch at Sta.1281+50 NB Median in Wetland #137.



Warner-Sutton NB, 15747

Impact Locations CH, CI & CJ: Looking west from pipe inlet at Sta. 1290+10 NB Median in Wetlands #129, 143, & 145.

Impact Locations CK, CL & CM: Looking east from pipe outlet at Sta. 1290+10 NB RT in Wetlands #129, 150 & 151.

Warner-Sutton NB, 15747

Impact Location CO: Looking up the roadside ditch at Sta.1300+50 NB Median in Wetland#160.

Warner-Sutton 15747 Standard Dredge and Fill Application Photos
Taken by NHDOT, Fuss & O'Neill & Google in May through June, 2022

Impact Location B: Looking up the roadside ditch at Sta. 1134+00 SB LT in Wetland #8.

Impact Location C: Looking north from pipe outlet at Sta. 1145+00 SB Median in Wetland #18.

Warner-Sutton SB, 15747

Impact Location J: Looking east toward pipe inlet at Sta. 1147+50 SB LT in Wetland #16.

Impact Location P: Looking west from pipe inlet at Sta. 1184+00 SB LT in Wetland #60.

Warner-Sutton SB, 15747

Impact Locations Q and R: Looking up the roadside ditch at Sta. 1184+00 SB in Wetland #60.

Impact Locations V, W, & X: Looking up the roadside ditch at Sta. 1192+50 SB LT in Wetland #66.

Warner-Sutton SB, 15747

Impact Locations AD, AE & AF: Looking east from pipe outlet at Sta. 1198+00 SB Median in Wetlands #68, 71 & 72.

Impact Locations AD, AE & AF: Looking at pipe outlet at Sta. 1198+00 SB Median in Wetlands #68, 71 & 72.

Warner-Sutton SB, 15747

Impact Locations AK & AL: Looking down the roadside ditch at Sta. 1205+25 SB in Wetland #70.

Impact Location AP: Looking east from pipe outlet t Sta. 1207+80 SB Median in Wetland #85.

Warner-Sutton SB, 15747

Impact Location AQ: Looking west from pipe outlet at Sta. 1207+80 SB LT in Wetland #70.

Impact Location AR: Looking down the roadside ditch at Sta. 1211+00 LT in Wetland #82.

Warner-Sutton SB, 15747

Impact Locations AS & AT: Looking south from pipe outlet at Sta. 1216+75 SB Median in Wetlands #89 & 90.

Impact Locations AS & AT: Looking at pipe outlet at Sta. 1216+75 SB Median in Wetlands #89 & 90.

Warner-Sutton SB, 15747

Impact Locations BA, BB & BC: Looking east from pipe outlet at Sta. 1229+40 SB Median in Wetlands #95, 96 & 97.

Impact Location BD: Looking east from pipe outlet at Sta. 1235+40 SB Median in Wetland #102.

Warner-Sutton SB, 15747

Impact Location BE: Looking west from pipe inlet at Sta. 1235+40 SB LT in Wetland #101.

Impact Location BH: Looking west from Sta. 1239+80 SB LT in Wetland #101.

Warner-Sutton SB, 15747

Impact Location BK: Looking South from pipe outlet at Sta. 1261+00 SB Median in Wetland #110.

Impact Locations BL & BM: Looking north from pipe inlet at Sta. 1261+00 SB LT in Wetlands #107 & 108.

Warner-Sutton SB, 15747

Impact Location BN: Looking down the roadside ditch at Sta. 1264+00 SB LT in Wetland #118.

Impact Location BO: Looking up the roadside ditch at Sta. 1267+00 SB LT in Wetland #108.

Warner-Sutton SB, 15747

Impact Location BP: Looking east from pipe outlet at Sta. 1278+75 SB Median in Wetland #138.

Impact Locations BR, BS, BT & BU: Looking west from pipe outlet at Sta. 1282+60 SB LT in Wetlands #121, 123, 124 & 125.

Warner-Sutton SB, 15747

Impact Locations BV, BW & BX: Looking east from pipe outlet at Sta. 1282+60 SB Median in Wetlands #124, 140 & 141.

Impact Locations BV, BW & BX: Looking at pipe outlet at Sta. 1282+60 SB Median in Wetlands #124, 140 & 141.

Warner-Sutton SB, 15747

Impact Locations BY & BZ: Looking up the roadside ditch at Sta. 1286+00 SB LT in Wetland #108.

Impact Locations CA, CB & CC: Looking west towards pipe outlet at Sta. 1287+40 SB Median in Wetlands #129, 142 & 144.

Warner-Sutton SB, 15747

Impact Locations CA, CB & CC: Looking east from pipe outlet at Sta. 1287+40 SB Median in Wetlands #129, 142 & 144.

Impact Locations CD, CE, CF & CG: Looking south from pipe inlet at Sta. 1287+40 SB LT in Wetlands #128, 129, 131 & 132.

Warner-Sutton SB, 15747

Impact Locations CN & CO: Looking down the roadside ditch at Sta. 1298+00 SB LT in Wetland #153.

Impact Location CP: Looking west from pipe inlet at Sta. 1301+60 SB LT in Wetland #153.

Warner-Sutton 15747 January 4, 2023
Wetlands Permit – Construction Sequence

Anticipated Project Start: April 2024
Anticipate Project Completion October 2025

2024 Season

Interstate I-89: NB MM 20.5 – 24.2 **Full Depth Pavement Reclaim**

1. Install perimeter controls at the limit of work for grading and drainage work. Drainage work is to be done during low flow conditions. Most drainage locations are anticipated to be dry, therefore water diversion may be needed at only a few locations.
2. Cold plane full width of barrel for one consecutive mile. (Only one mile per barrel will be worked on simultaneously.)
3. Reclaim right lane and shoulder (maintain traffic in left lane).
4. Replace slope pipes, catch basins, and drop inlets including stub pipe connections for cross pipes connected to catch basins. Install underdrain and restore ditches affected by underdrain installation. Install stormwater conveyance piping for BMP's.
5. Fine grade right lane and shoulder.
6. Pave binder course in right lane and shoulder.
7. Place pavement markings on binder course to prepare for traffic.
8. Repeat 3-7 on left lane and shoulder. However, on the left shoulder there will be an additional step after step 4, which will be using reclaim and embankment material to widen the median shoulder.
9. Pave wearing course full width on all lanes.
10. Construct bituminous curb at the locations shown on plans, construct guardrail at the location shown on plans. Adjust rims of all catch basins within the pavement limits.
11. Place pavement markings on wearing course for all lanes.
12. Stabilize all disturbed areas prior to winter season. In areas of temporary wetland impacts adjacent to this work, temporary matting and/or material will be used in order to avoid rutting and disturbing wetland vegetation or soils. Trees cleared (not grubbed) will re-establish naturally. Wetland seed mix will be used to stabilize temporary wetland impact areas.

2025 Season

Interstate I-89: SB MM 20.5-24.2, **Full Depth Pavement Reclaim**

1. Repeat steps for 2024 Season Full Depth Pavement Reclaim

Concurrent Work (2024 & 2025 Seasons)

Project Wide: Interstate I-89

1. Initial Tree Clearing and Grubbing. In areas of temporary wetland impacts adjacent to this work, temporary matting and/or material will be used in order to avoid rutting and

disturbing wetland vegetation or soils. Trees cleared (not grubbed) will re-establish naturally. Wetland seed mix will be used to stabilize temporary wetland impact areas.

Bridge Work (Sutton 191/058, Sutton 192/057):

Work on these two bridges is limited to cold planning and paving and will be included in the appropriate portion of roadway work.

Rock Slope:

1. Install traffic control and erosion control BMPs.
2. Clear Trees and brush as necessary.
3. Remove loose rock and debris using mechanical methods.
4. Remove temporary erosion controls upon stabilization.

Stormwater BMPs:

1. Install perimeter/erosion control BMPs.
2. Install designated BMP (treatments swales in the median).
3. Install associated BMP storm collection/conveyance drainage system.
4. Stabilize all disturbed area.
5. Remove temporary erosion control.

UV Cured-In-Place-Lining:

1. Install erosion control BMPs.
2. Construct access roads to access the outlets of DN 11N and DN 15N.
3. Redirect water as necessary. The work will occur in low flow/dry conditions. Only DN 15N of the five culverts that are being lined is a Tier 1 stream so most likely only one location may need a water diversion. A pump to accommodate a 2-year storm event will be on site in the event it is needed.
4. Install cured in place linings and stone aprons per design.
5. Re-establish water flow as needed.
6. Remove temporary erosion controls upon stabilization. In areas of temporary wetland impacts adjacent to this work, temporary matting and/or material will be used in order to not rut or disturb vegetation or soils. Trees cleared (not grubbed) will re-establish naturally. Wetland seed mix will be used to stabilize temporary wetland impact areas.

Miscellaneous Drainage:

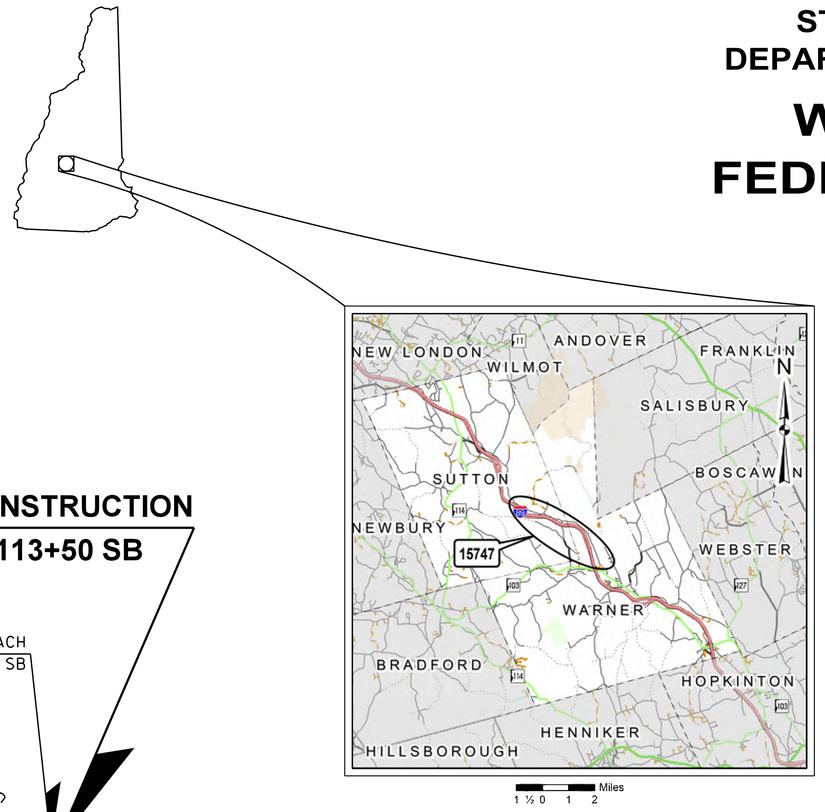
1. Install erosion control BMPs.
2. Redirect water as necessary. The work will occur in low flow/dry conditions; in which case water diversion is unlikely to be needed. However, at DN 5N the culvert is located at a Tier 1 stream crossing, and all past field visits have found this location to have standing water at both the inlet and outlet. There is a strong likelihood that water diversion at this location will be necessary.
3. As called for in plans replace headwalls, sections of pipe or conduct other drainage work
4. Install stone pads at inlet and outlet as called for in plans to prevent erosion around the headwalls.
5. Re-establish water flow as needed.

6. Remove temporary erosion controls upon stabilization. In areas of temporary wetland impacts adjacent to this work, temporary matting and/or material will be used in order to not rut or disturb vegetation or soils. Wetland seed mix will be used to stabilize temporary wetland impact areas.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

WETLAND PLANS
FEDERAL AID PROJECT

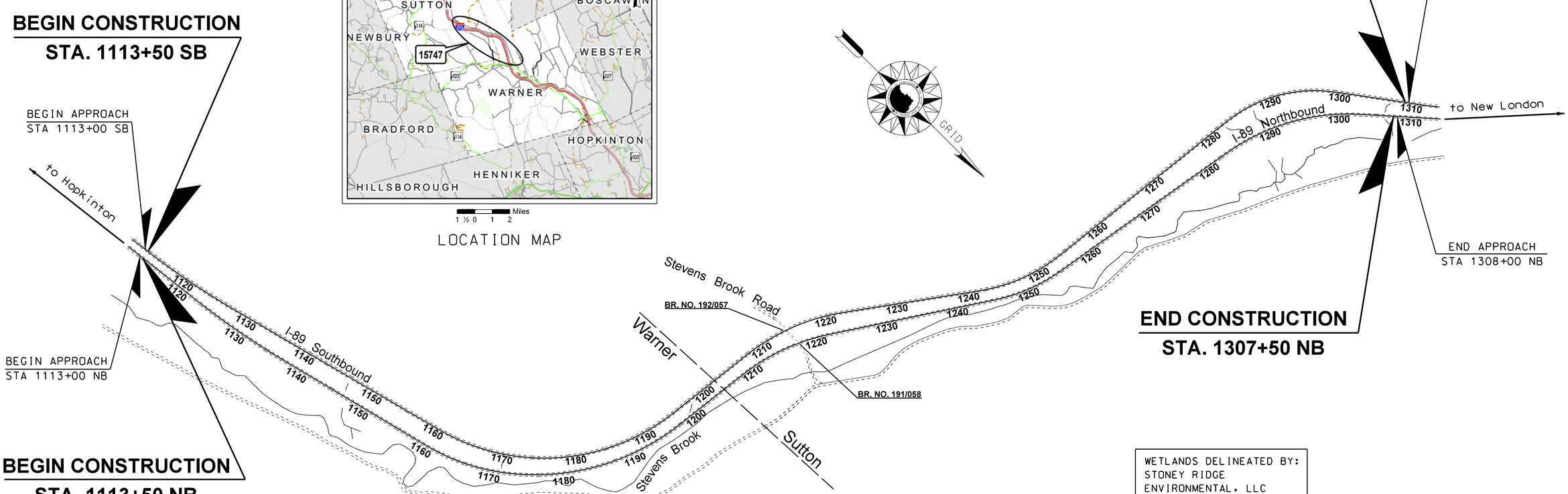
X-A000 (942)
N.H. PROJECT NO. 15747
INTERSTATE ROUTE 89



LOCATION MAP

BEGIN CONSTRUCTION
STA. 1113+50 SB

END CONSTRUCTION
STA. 1309+00 SB



BEGIN CONSTRUCTION
STA. 1113+50 NB

END CONSTRUCTION
STA. 1307+50 NB

		DATE
DRAWN BY	MMR	03/23
CHECKED BY	AWJ	03/23

INDEX OF SHEETS

WETLANDS DELINEATED BY:
STONEY RIDGE
ENVIRONMENTAL, LLC
OCTOBER-DECEMBER 2021

TOWNS OF WARNER & SUTTON

COUNTY OF MERRIMACK

SCALE: 1" = 700'

FOR CONSTRUCTION AND ALIGNMENT DETAILS - SEE CONSTRUCTION PLANS

NHDOT THE STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR APPROVAL:

DIRECTOR OF PROJECT DEVELOPMENT — DATE

APPROVED:

ASSISTANT COMMISSIONER AND CHIEF ENGINEER — DATE

DRAWING NAME	FEDERAL PROJECT NO.	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15747fsw	X-A000 (942)	15747	1	38

GENERAL

EDGE OF PAVEMENT — PROPOSED ROADWAY
TRAVELED WAY — existing roadway — (pavement removed outside slope lines)

DRIVEWAYS — (label surface type)

BUILDINGS — (building to be removed)
(label house or type of building)

FOUNDATION — (label type)

LEACH FIELD — leach field

BRIDGE CROSSINGS — STREAM — OVERPASS

STEPS AND WALK — (label type)

INTERMITTENT WATER COURSE

SHORE LINE — river/stream — pond — (label name of water body)

POTENTIAL WET AREA SYMBOL

BRUSH OR WOODS LINE

TREES (PLANS) — (deciduous) (coniferous) (stump)

TREE OR STUMP (CROSS-SECTIONS) — (show station, circumference in feet & type)

HEDGE — (label type)

MONITORING WELL — mon W

WELL — W

FLAG POLE — fp

ORIGINAL GROUND (TYPICALS)

ROCK OUTCROP

ROCK LINE (TYPICALS & SECTIONS ONLY)

GUARDRAIL (label type) — existing — PROPOSED — bgr — cgr

JERSEY BARRIER

CURB (LABEL TYPE)

STONE WALL

RETAINING WALL (LABEL TYPE) — (points toward retained ground)

FENCE (LABEL TYPE)

SIGNS — (single post) — (double post)

GAS PUMP — gp

FUEL TANK (ABOVE GROUND) — ft (label size & type)

STORAGE TANK FILLER CAP — fc

SEPTIC TANK — S

GRAVE — gr

MAILBOX — mb

VENT PIPE — vp

SATELLITE DISH ANTENNA — da

PHONE — ph

GROUND LIGHT/LAMP POST — gl — lp

BORING LOCATION — B

TEST PIT — TP

INTERSTATE NUMBERED HIGHWAY — 293

UNITED STATES NUMBERED HIGHWAY — 3

STATE NUMBERED HIGHWAY — 102

SHORELAND - WETLAND

WETLAND DESIGNATION AND TYPE — 2 PUB2E

DELINEATED WETLAND — DW
ORDINARY HIGH WATER — OHW
TOP OF BANK — TOB
TOP OF BANK & ORDINARY HIGH WATER — TOBOHW
NORMAL HIGH WATER — NHW
WIDTH AT BANK FULL — WBF
PRIME WETLAND — PWET
PRIME WETLAND 100' BUFFER — PWET100
NON-JURISDICTIONAL DRAINAGE AREA — NJDA
COWARDIN DISTINCTION LINE — CDL
TIDAL BUFFER ZONE — TBZ
DEVELOPED TIDAL BUFFER ZONE — DTBZ
HIGHEST OBSERVABLE TIDE LINE — HOTL
MEAN HIGH WATER — MHW
MEAN LOW WATER — MLW
VERNAL POOL — VP
SPECIAL AQUATIC SITE — SAS
REFERENCE LINE — REF
WATER FRONT BUFFER — WB50
NATURAL WOODLAND BUFFER — NWB150
PROTECTED SHORELAND — PS250
INVASIVE SPECIES LABEL — I.S. I — I.S. II
INVASIVE SPECIES — INV

FLOODPLAIN / FLOODWAY

500 YEAR FLOODPLAIN BOUNDARY — FP500
100 YEAR FLOODPLAIN BOUNDARY — FP100
FLOODWAY — FW

ENGINEERING

CONSTRUCTION BASELINE — 30 — 31 — 32

PC, PT, POT (ON CONST BASELINE)

PI (IN CONSTRUCTION BASELINES)

INTERSECTION OR EQUATION OF TWO LINES

ORIGINAL GROUND LINE (PROFILES AND CROSS-SECTIONS)

PROFILE GRADE LINE (PROFILES AND CROSS-SECTIONS)

CLEARING LINE — SLOPE LINE

SLOPE LINE (FILL)

SLOPE LINE (CUT)

PROFILES AND CROSS SECTIONS:
ORIGINAL GROUND ELEVATION (LEFT) — 72.5
FINISHED GRADE ELEVATION (RIGHT) — 79.14

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION ∘ BUREAU OF HIGHWAY DESIGN

STANDARD SYMBOLS

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
11-21-2014	15747STDSYM	15747	2	38

DRAINAGE

MANHOLE

CATCH BASIN — cb

DROP INLET — di

(existing) (PROPOSED)

DRAINAGE PIPE (existing) (label size & type)

DRAINAGE PIPE (PROPOSED)

UNDERDRAIN (existing) W/ FLUSHING BASIN — fb (label size & type)

UNDERDRAIN (PROPOSED) W/ FLUSHING BASIN

show direction of flow

HEADER (existing & PROPOSED) (with stone outlet protection)

END SECTION (existing & PROPOSED) METAL or PLASTIC; RCP

OPEN DITCH (PROPOSED)

EROSION CONTROL/ STONE SLOPE PROTECTION

BOUNDARIES / RIGHT-OF-WAY

RIGHT-OF-WAY LINE (label type)

RR RIGHT-OF-WAY LINE

PROPERTY LINE

PROPERTY LINE (COMMON OWNER) — Z — Z —

TOWN LINE — BOW / CONCORD

COUNTY LINE — COOS / GRAFTON

STATE LINE — MAINE / NEW HAMPSHIRE

NATIONAL FOREST

CONSERVATION LAND — LC —

BENCH MARK / SURVEY DISK

BOUND — bnd (PROPOSED)

STATE LINE/ TOWN LINE MONUMENT — S/L T/L

NHDOT PROJECT MARKER

IRON PIPE OR PIN — ip

DRILL HOLE IN ROCK — dh

TAX MAP AND LOT NUMBER — 156 / 14; 1642/341; 6.80 Ac.±

PROPERTY PARCEL NUMBER — 12

HISTORIC PROPERTY — H

UTILITIES

existing PROPOSED

TELEPHONE POLE

POWER POLE

JOINT OCCUPANCY

MISCELLANEOUS/UNKNOWN POLE

GUY POLE OR PUSH BRACE

(plot point at face not center of symbol)

LIGHT POLE

LIGHT ON POWER POLE

LIGHT ON JOINT POLE

POLE STATUS:
REMOVE, LEAVE, PROPOSED, OR TEMPORARY AS APPLICABLE e.g.:

R L — P+04 25.0' — T+04 25.0'

RAILROAD — (label ownership)

RAILROAD SIGN

RAILROAD SIGNAL

UTILITY JUNCTION BOX — jb — JB

OVERHEAD WIRE — OW — (label type)

UNDERGROUND UTILITIES

WATER (on existing lines label size, type and note if abandoned) — W — PW

SEWER — S — PS

TELEPHONE — T — PT

ELECTRIC — E — PE

GAS — G — PG

LIGHTING — L — PL

INTELLIGENT TRANSPORTATION SYSTEM — ITS

FIBER OPTIC — FO — PFO

WATER SHUT OFF — WSO

GAS SHUT OFF — GSO

HYDRANT

MANHOLES

SEWER — MHS

TELEPHONE — MHT

ELECTRICAL — MHE

GAS — MHG

UNKNOWN — U

TRAFFIC SIGNALS / ITS

existing PROPOSED

MAST ARM (existing) — 30' MA (NOTE ANGLE FROM ℄)

OPTICOM RECEIVER

OPTICOM STROBE

TRAFFIC SIGNAL

PEDESTAL WITH PEDESTRIAN SIGNAL HEADS AND PUSH BUTTON UNIT

SIGNAL CONDUIT — C — PC

CONTROLLER CABINET — cc — CC

METER PEDESTAL — mp — MP

PULL BOX — pb — PB

LOOP DETECTOR (QUADRUPOLE) (label size)

LOOP DETECTOR (RECTANGULAR) (label size)

CAMERA POLE (CCTV)

FIBER OPTIC DELINEATOR — fod — FOD

FIBER OPTIC SPLICE VAULT — SVF

ITS EQUIPMENT CABINET — its — ITS

VARIABLE SPEED LIMIT SIGN

DYNAMIC MESSAGE SIGN

ROAD AND WEATHER INFO SYSTEM

CONSTRUCTION NOTES

CURB MARK NUMBER - BITUMINOUS	B-1
CURB MARK NUMBER - GRANITE	G-1
CLEARING AND GRUBBING AREA	A
DRAINAGE NOTE	1
EROSION CONTROL NOTE	A
FENCING NOTE	A
GUARDRAIL NOTE	1
ITS NOTE	1
LIGHTING NOTE	A
TRAFFIC SIGNAL NOTE	1

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION ∘ BUREAU OF HIGHWAY DESIGN

STANDARD SYMBOLS

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
9-1-2016	15747STDSYM	15747	3	38

WETLAND IMPACT SUMMARY - WARNER							
WETLAND NUMBER	WETLAND PLANS SHEET NUMBER	WETLAND CLASSIFICATION	LOCATION	N.H.W.B. & A.C.O.E. (WETLAND)	TEMPORARY IMPACTS		CHANNEL
				SF	SF		LF
12	2	PFO1E	A	54	--		--
8	2	PEM1E	B	--	93		--
18	3	PF01/4Ex	C	61	--		--
19	3	PF01/4E	D	89	--		--
20	3	R4SB4/5x	E	89	--		18
21	3	PF01/4E	F	215	--		--
26	3	R4SB4/5	G	141	--		30
25	3	PEM1E	H	16	--		--
27	3	PEM1E	I	43	--		--
16	3	PF01/4E	J	228	110		--
47	4	PF01/4E	K	122	--		--
33	4	PEM1E	L	111	--		--
38	4	PEM1Ex	M	--	121		--
38	4	PEM1Ex	N	194			--
57	5	PEM1E	O	--	190		--
60	6	PSS1Ex	P	488	--		--
60	6	PSS1Ex	Q	--	255		--
60	6	PSS1Ex	R	--	761		--
63	6	PF01/4E	S	424	--		--
64	6	R4SB2/3	T	294	--		36
65	6	PF01/4E	U	3587	--		--
66	7	PSS1EX	V	--	190		--
66	7	PSS1EX	W	12	--		--
66	7	PSS1EX	X	92	--		--
71	7	PF01/4E	Y	161	--		--
68	7	R4SB3/4	Z	80	--		23
72	7	PF01/4E	AA	129	--		--
73	7	PEM1Ex	AB	391	168		--
76	7	PF01/4E	AC	289	--		--
71	7	PF01/4E	AD	212	--		--
68	7	R4SB3/4	AE	146	--		50
72	7	PF01/4E	AF	151	--		--
73	7	PEM1Ex	AG	--	817		--
78	7	PF01/4E	AH	239	--		--
		TOTAL PERMANENT		8058			157
		TOTAL TEMPORARY			2705		0

WETLAND IMPACT SUMMARY - SUTTON							
WETLAND NUMBER	WETLAND PLANS SHEET NUMBER	WETLAND CLASSIFICATION	LOCATION	N.H.W.B. & A.C.O.E. (WETLAND)	TEMPORARY IMPACTS		CHANNEL
				SF	SF		LF
73	7	PEM1Ex	AI	--	1795		--
75	7	PF01/4E	AJ	--	138		--
70	7	PEM1Ex	AK	90	--		--
70	7	PEM1Ex	AL	--	315		--
79	7	PF01/4E	AM	98	--		--
80	7	PEM1Ex	AN	--	165		--
73	7	PEM1Ex	AO	156	--		--
85	8	PF01/4E	AP	137	--		--
70	8	PEM1Ex	AQ	--	433		--
82	8	PF01/4E	AR	35	--		--
89	8	PF01/4E	AS	1847	--		--
90	8	R4SB3	AT	181	--		70
95	9	PF01/4E	AU	122	--		--
96	9	R4SB3/4	AV	80	--		--
97	9	PF01/4E	AW	78	--		--
99	9	PF01/4E	AX	45	--		--
96	9	R4SB3/4	AY	86	--		--
100	9	PF01/4E	AZ	216	--		--
95	9	PF01/4E	BA	39	--		--
96	9	R4SB3/4	BB	31	--		--
97	9	PF01/4E	BC	21	--		--
102	10	PF01/4E	BD	846	--		--
101	10	PF01/4E	BE	163	--		--
103	10	PSS1Ex	BF	231	--		--
103	10	PSS1Ex	BG	392	566		--
101	10	PF01/4E	BH	276	--		--
110	11	PF01/4E	BI	249	--		--
115	11	PSS1/4Eb	BJ	61	--		--
110	11	PF01/4E	BK	839	--		--
107	11	PF01/4E	BL	243	--		--
108	11	PEM1Ex	BM	198	--		--
108	12	PEM1Ex	BN	--	546		--
108	12	PEM1Ex	BO	34	--		--
138	13	PF04E	BP	246	--		--
137	13	PEM1Ex	BQ	--	74		--
121	13	PEM1Ex	BR	275	--		--
123	13	PF01/4E	BS	341	--		--
124	13	R4SB3/4	BT	33	--		14
125	13	PF01/4E	BU	137	--		--
140	13	PF01/4E	BV	201	--		--
124	13	R4SB3/4	BW	182	--		49
141	13	PF01/4E	BX	473	--		--
127	13	PEM1Ex	BY	--	92		--
128	13	PF01/4E	BZ	183	--		--
142	13	PF01/4E	CA	480	--		--
129	13	R4SB4	CB	155	--		40
144	13	PF01/4E	CC	138	--		--
128	13	PF01/4E	CD	112	--		--
129	13	R4SB4	CE	247	--		20
132	13	PEM1E	CF	108	--		--
133	13	PEM1E	CG	82	--		--
143	13	PSS1E	CH	49	--		--
129	13	R4SB4	CI	107	--		14
145	13	PSS1E	CJ	188	--		--
150	13	PSS1E	CK	189	--		--
129	13	R4SB4	CL	160	--		25
151	13	PSS1E	CM	199	--		--
153	14	PEM1Ex	CN	53	--		--
153	14	PEM1Ex	CO	--	101		--
153	14	PEM1Ex	CP	--	370		--
160	14	PF01/4E	CQ	364	130		--
		TOTAL PERMANENT		11496			232
		TOTAL TEMPORARY			4725		0

WETLANDS CLASSIFICATION CODES	
PEM1E	PALUSTRINE EMERGENT PERSISTENT SEASONALLY FLOODED/SATURATED
PEM1Ex	PALUSTRINE EMERGENT PERSISTENT SEASONALLY FLOODED/SATURATED EXCAVATED
PFO1E	PALUSTRINE FORESTED BROAD-LEAVED DECIDUOUS SEASONALLY FLOODED/SATURATED
PFO1/4E	PALUSTRINE FORESTED BROAD-LEAVED DECIDUOUS/NEEDLE-LEAVED EVERGREEN SEASONALLY FLOODED/SATURATED
PF01/4Ex	PALUSTRINE FORESTED BROAD-LEAVED DECIDUOUS/NEEDLE-LEAVED EVERGREEN SEASONALLY FLOODED/SATURATED EXCAVATED
PF04E	PALUSTRINE FORESTED NEEDLE-LEAVED EVERGREEN, SEASONALLY FLOODED/SATURATED
PSS1E	PALUSTRINE, SCRUB-SHRUB, BROAD-LEAVED DECIDUOUS, SEASONALLY FLOODED/SATURATED
PSS1Ex	PALUSTRINE, SCRUB-SHRUB, BROAD-LEAVED DECIDUOUS, SEASONALLY FLOODED/SATURATED EXCAVATED
PSS1/4Eb	PALUSTRINE, SCRUB-SHRUB, BROAD-LEAVED DECIDUOUS, /NEEDLE-LEAVED EVERGREEN, SEASONALLY FLOODED/SATURATED
R4SB2/3	RIVERINE INTERMITTENT STREAMBED RUBBLE/COBBLE-GRAVEL
R4SB3	RIVERINE INTERMITTENT STREAMBED COBBLE-GRAVEL
R4SB3/4	RIVERINE INTERMITTENT STREAMBED COBBLE-GRAVEL/SAND
R4SB4	RIVERINE INTERMITTENT STREAMBED SAND
R4SB4/5	RIVERINE INTERMITTENT STREAMBED SAND/MUD
R4SB4/5x	RIVERINE INTERMITTENT STREAMBED SAND/MUD EXCAVATED

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION

SDR PROCESSED		DATE
NEW DESIGN	AWJ	DATE 03/23
SHEET CHECKED	DAM	DATE 03/23
AS BUILT DETAILS		DATE

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

WETLAND IMPACT TABLE

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15747wetimpact	15747	4	38

EROSION CONTROL STRATEGIES

1. ENVIRONMENTAL COMMITMENTS:
   1.1. THESE GUIDELINES DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH ANY CONTRACT PROVISIONS, OR APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
   1.2. THIS PROJECT WILL BE SUBJECT TO THE US EPA'S NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORM WATER CONSTRUCTION GENERAL PERMIT AS ADMINISTERED BY THE ENVIRONMENTAL PROTECTION AGENCY (EPA). THIS PROJECT IS SUBJECT TO REQUIREMENTS IN THE MOST RECENT CONSTRUCTION GENERAL PERMIT (CGP).
   1.3. THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE NHDES WETLAND PERMIT, THE US ARMY CORPS OF ENGINEERS PERMIT, WATER QUALITY CERTIFICATION AND THE SPECIAL ATTENTION ITEMS INCLUDED IN THE CONTRACT DOCUMENTS.
   1.4. ALL STORM WATER, EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE NEW HAMPSHIRE STORMWATER MANUAL, VOLUME 3, EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION (DECEMBER 2008) (BMP MANUAL) AVAILABLE FROM THE NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES (NHDES).
   1.5. THE CONTRACTOR SHALL COMPLY WITH RSA 485-A:17, AND ALL, PUBLISHED NHDES ALTERATION OF TERRAIN ENV-WQ 1500 REQUIREMENTS (HTTP://DES.NH.GOV/ORGANIZATION/COMMISSIONER/LEGAL/RULES/INDEX.HTM)
   1.6. THE CONTRACTOR IS DIRECTED TO REVIEW AND COMPLY WITH SECTION 107.1 OF THE CONTRACT AS IT REFERS TO SPILLAGE, AND ALSO WITH REGARDS TO EROSION, POLLUTION, AND TURBIDITY PRECAUTIONS.

2. STANDARD EROSION CONTROL SEQUENCING APPLICABLE TO ALL CONSTRUCTION PROJECTS:
   2.1. PERIMETER CONTROLS SHALL BE INSTALLED PRIOR TO EARTH DISTURBING ACTIVITIES. PERIMETER CONTROLS AND STABILIZED CONSTRUCTION EXITS SHALL BE INSTALLED AS SHOWN IN THE BMP MANUAL AND AS DIRECTED BY THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) PREPARER.
   2.2. EROSION, SEDIMENTATION CONTROL MEASURES AND INFILTRATION BASINS SHALL BE CLEANED, REPLACED AND AUGMENTED AS NECESSARY TO PREVENT SEDIMENTATION BEYOND PROJECT LIMITS THROUGHOUT THE PROJECT DURATION.
   2.3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED IN ACCORDANCE WITH THE CONSTRUCTION GENERAL PERMIT AND SECTION 645 OF THE NHDOT SPECIFICATIONS FOR ROAD AND BRIDGES CONSTRUCTION.
   2.4. AN AREA SHALL BE CONSIDERED STABLE IF ONE OF THE FOLLOWING HAS OCCURRED:
      (A) BASE COURSE GRAVELS HAVE BEEN INSTALLED IN AREAS TO BE PAVED;
      (B) A MINIMUM OF 85% VEGETATED GROWTH HAS BEEN ESTABLISHED;
      (C) A MINIMUM OF 3" OF NON-EROSIVE MATERIAL SUCH AS STONE OR RIP-RAP HAS BEEN INSTALLED;
      (D) TEMPORARY SLOPE STABILIZATION CONFORMING TO TABLE 1 HAS BEEN PROPERLY INSTALLED
   2.5. ALL STOCKPILES SHALL BE CONTAINED WITH A PERIMETER CONTROL. IF THE STOCKPILE IS TO REMAIN UNDISTURBED FOR MORE THAN 14 DAYS, MULCHING WILL BE REQUIRED.
   2.6. A WATER TRUCK SHALL BE AVAILABLE TO CONTROL EXCESSIVE DUST AT THE DIRECTION OF THE CONTRACT ADMINISTRATOR.
   2.7. TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES SHALL REMAIN UNTIL THE AREA HAS BEEN PERMANENTLY STABILIZED.
   2.8. CONSTRUCTION PERFORMED ANY TIME BETWEEN NOVEMBER 30" AND MAY 1" OF ANY YEAR SHALL BE CONSIDERED WINTER CONSTRUCTION AND SHALL CONFORM TO THE FOLLOWING REQUIREMENTS.
      (A) ALL PROPOSED VEGETATED AREAS WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15", OR WHICH ARE DISTURBED AFTER OCTOBER 15", SHALL BE STABILIZED IN ACCORDANCE WITH TABLE 1.
      (B) ALL DITCHES OR SWALES WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15", OR WHICH ARE DISTURBED AFTER OCTOBER 15", SHALL BE STABILIZED TEMPORARILY WITH STONE OR IN ACCORDANCE WITH TABLE 1.
      (C) AFTER NOVEMBER 30" INCOMPLETE ROAD SURFACES, WHERE WORK HAS STOPPED FOR THE SEASON, SHALL BE PROTECTED IN ACCORDANCE WITH TABLE 1.
      (D) WINTER EXCAVATION AND EARTHWORK SHALL BE DONE SUCH THAT NO MORE THAN 1 ACRE OF THE PROJECT IS WITHOUT STABILIZATION AT ONE TIME, UNLESS A WINTER CONSTRUCTION PLAN HAS BEEN APPROVED BY NHDOT THAT MEETS THE REQUIREMENTS OF ENV-WQ 1505.02 AND ENV-WQ 1505.05.
      (E) A SWPPP AMENDMENT SHALL BE SUBMITTED TO THE DEPARTMENT, FOR APPROVAL, ADDRESSING COLD WEATHER STABILIZATION (ENV-WQ 1505.05) AND INCLUDING THE REQUIREMENTS OF NO LESS THAN 30 DAYS PRIOR TO THE COMMENCEMENT OF WORK SCHEDULED AFTER NOVEMBER 30".

GENERAL CONSTRUCTION PLANNING AND SELECTION OF STRATEGIES TO CONTROL EROSION AND SEDIMENT ON HIGHWAY CONSTRUCTION PROJECTS

3. PLAN ACTIVITIES TO ACCOUNT FOR SENSITIVE SITE CONDITIONS:
   3.1. CLEARLY FLAG AREAS TO BE PROTECTED IN THE FIELD AND PROVIDE CONSTRUCTION BARRIERS TO PREVENT TRAFFICKING OUTSIDE OF WORK AREAS.
   3.2. CONSTRUCTION SHALL BE SEQUENCED TO LIMIT THE DURATION AND AREA OF EXPOSED SOILS.
   3.3. PROTECT AND MAXIMIZE EXISTING NATIVE VEGETATION AND NATURAL FOREST BUFFERS BETWEEN CONSTRUCTION ACTIVITY AND SENSITIVE AREAS.
   3.4. WHEN WORK IS PERFORMED IN AND NEAR WATER COURSES, STREAM FLOW DIVERSION METHODS SHALL BE IMPLEMENTED PRIOR TO ANY EXCAVATION OR FILLING.
   3.5. WHEN WORK IS PERFORMED WITHIN 50 FEET OF SURFACE WATERS (WETLAND, OPEN WATER OR FLOWING WATER), PERIMETER CONTROL SHALL BE ENHANCED CONSISTENT WITH SECTION 2.1.2.1. OF THE 2012 NPDES CONSTRUCTION GENERAL PERMIT.

4. MINIMIZE THE AMOUNT OF EXPOSED SOIL:
   4.1. CONSTRUCTION SHALL BE SEQUENCED TO LIMIT THE DURATION AND AREA OF EXPOSED SOILS. MINIMIZE THE AREA OF EXPOSED SOIL AT ANY ONE TIME. PHASING SHALL BE USED TO REDUCE THE AMOUNT AND DURATION OF SOIL EXPOSED TO THE ELEMENTS AND VEHICLE TRACKING.
   4.2. UTILIZE TEMPORARY MULCHING OR PROVIDE ALTERNATE TEMPORARY STABILIZATION ON EXPOSED SOILS IN ACCORDANCE WITH TABLE 1.
   4.3. THE MAXIMUM AMOUNT OF DISTURBED EARTH SHALL NOT EXCEED A TOTAL OF 5 ACRES FROM MAY 1" THROUGH NOVEMBER 30", OR EXCEED ONE ACRE DURING WINTER MONTHS, UNLESS THE CONTRACTOR DEMONSTRATES TO THE DEPARTMENT THAT THE ADDITIONAL AREA OF DISTURBANCE IS NECESSARY TO MEET THE CONTRACTORS CRITICAL PATH METHOD SCHEDULE (CPM), AND THE CONTRACTOR HAS ADEQUATE RESOURCES AVAILABLE TO ENSURE THAT ENVIRONMENTAL COMMITMENTS WILL BE MET.

5. CONTROL STORMWATER FLOWING ONTO AND THROUGH THE PROJECT:
   5.1. DIVERT OFF SITE RUNOFF OR CLEAN WATER AWAY FROM THE CONSTRUCTION ACTIVITY TO REDUCE THE VOLUME THAT NEEDS TO BE TREATED ON SITE.
   5.2. DIVERT STORM RUNOFF FROM UPSLOPE DRAINAGE AREAS AWAY FROM DISTURBED AREAS, SLOPES, AND AROUND ACTIVE WORK AREAS AND TO A STABILIZED OUTLET LOCATION.
   5.3. CONSTRUCT IMPERMEABLE BARRIERS AS NECESSARY TO COLLECT OR DIVERT CONCENTRATED FLOWS FROM WORK OR DISTURBED AREAS.
   5.4. STABILIZE, TO APPROPRIATE ANTICIPATED VELOCITIES, CONVEYANCE CHANNELS OR PUMPING SYSTEMS NEEDED TO CONVEY CONSTRUCTION STORMWATER TO BASINS AND DISCHARGE LOCATIONS PRIOR TO USE.
   5.5. DIVERT OFF-SITE WATER THROUGH THE PROJECT IN AN APPROPRIATE MANNER SO NOT TO DISTURB THE UPSTREAM OR DOWNSTREAM SOILS, VEGETATION OR HYDROLOGY BEYOND THE PERMITTED AREA.

6. PROTECT SLOPES:
   6.1. INTERCEPT AND DIVERT STORM RUNOFF FROM UPSLOPE DRAINAGE AREAS AWAY FROM UNPROTECTED AND NEWLY ESTABLISHED AREAS AND SLOPES TO A STABILIZED OUTLET OR CONVEYANCE.
   6.2. CONSIDER HOW GROUNDWATER SEEPAGE ON CUT SLOPES MAY IMPACT SLOPE STABILITY AND INCORPORATE APPROPRIATE MEASURES TO MINIMIZE EROSION.
   6.3. CONVEY STORMWATER DOWN THE SLOPE IN A STABILIZED CHANNEL OR SLOPE DRAIN.
   6.4. THE OUTER FACE OF THE FILL SLOPE SHOULD BE IN A LOOSE RUFFLED CONDITION PRIOR TO TURF ESTABLISHMENT. TOPSOIL OR HUMUS LAYERS SHALL BE TRACKED UP AND DOWN THE SLOPE, DISKED, HARROWED, DRAGGED WITH A CHAIN OR MAT, MACHINE-RAKED, OR HAND-WORKED TO PRODUCE A RUFFLED SURFACE.

7. ESTABLISH STABILIZED CONSTRUCTION EXITS:
   7.1. INSTALL AND MAINTAIN CONSTRUCTION EXITS, ANYWHERE TRAFFIC LEAVES A CONSTRUCTION SITE ONTO A PUBLIC RIGHT-OF-WAY.
   7.2. SWEEP ALL CONSTRUCTION RELATED DEBRIS AND SOIL FROM THE ADJACENT PAVED ROADWAYS AS NECESSARY.

8. PROTECT STORM DRAIN INLETS:
   8.1. DIVERT SEDIMENT LADEN WATER AWAY FROM INLET STRUCTURES TO THE EXTENT POSSIBLE.
   8.2. INSTALL SEDIMENT BARRIERS AND SEDIMENT TRAPS AT INLETS TO PREVENT SEDIMENT FROM ENTERING THE DRAINAGE SYSTEM.
   8.3. CLEAN CATCH BASINS, DRAINAGE PIPES, AND CULVERTS IF SIGNIFICANT SEDIMENT IS DEPOSITED.
   8.4. DROP INLET SEDIMENT BARRIERS SHOULD NEVER BE USED AS THE PRIMARY MEANS OF SEDIMENT CONTROL AND SHOULD ONLY BE USED TO PROVIDE AN ADDITIONAL LEVEL OF PROTECTION TO STRUCTURES AND DOWN-GRADIENT SENSITIVE RECEPTORS.

9. SOIL STABILIZATION:
   9.1. WITHIN THREE DAYS OF THE LAST ACTIVITY IN AN AREA, ALL EXPOSED SOIL AREAS, WHERE CONSTRUCTION ACTIVITIES ARE COMPLETE, SHALL BE STABILIZED.
   9.2. IN ALL AREAS, TEMPORARY SOIL STABILIZATION MEASURES SHALL BE APPLIED IN ACCORDANCE WITH THE STABILIZATION REQUIREMENTS (SECTION 2.2) OF THE 2012 CGP. (SEE TABLE 1 FOR GUIDANCE ON THE SELECTION OF TEMPORARY SOIL STABILIZATION MEASURES.)
   9.3. EROSION CONTROL SEED MIX SHALL BE SOWN IN ALL INACTIVE CONSTRUCTION AREAS THAT WILL NOT BE PERMANENTLY SEEDED WITHIN TWO WEEKS OF DISTURBANCE AND PRIOR TO SEPTEMBER 15, OF ANY GIVEN YEAR. IN ORDER TO ACHIEVE VEGETATIVE STABILIZATION PRIOR TO THE END OF THE GROWING SEASON.
   9.4. SOIL TACKIFIERS MAY BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND REAPPLIED AS NECESSARY TO MINIMIZE SOIL AND MULCH LOSS UNTIL PERMANENT VEGETATION IS ESTABLISHED.

10. RETAIN SEDIMENT ON-SITE AND CONTROL DEWATERING PRACTICES:
   10.1. TEMPORARY SEDIMENT BASINS (CGP-SECTION 2.1.3.2) OR SEDIMENT TRAPS (ENV-WQ 1506.10) SHALL BE SIZED TO RETAIN, ON SITE, THE VOLUME OF A 2-YEAR 24-HOUR STORM EVENT FOR ANY AREA OF DISTURBANCE OR 3,600 CUBIC FEET OF STORMWATER RUNOFF PER ACRE OF DISTURBANCE, WHICHEVER IS GREATER. TEMPORARY SEDIMENT BASINS USED TO TREAT STORMWATER RUNOFF FROM AREAS GREATER THAN 5-ACRES OF DISTURBANCE SHALL BE SIZED TO ALSO CONTROL STORMWATER RUNOFF FROM A 10-YEAR 24 HOUR STORM EVENT. ON-SITE RETENTION OF THE 10-YEAR 24-HOUR EVENT IS NOT REQUIRED.
   10.2. CONSTRUCT AND STABILIZE DEWATERING INFILTRATION BASINS PRIOR TO ANY EXCAVATION THAT MAY REQUIRE DEWATERING.
   10.3. TEMPORARY SEDIMENT BASINS OR TRAPS SHALL BE PLACED AND STABILIZED AT LOCATIONS WHERE CONCENTRATED FLOW (CHANNELS AND PIPES) DISCHARGE TO THE SURROUNDING ENVIRONMENT FROM AREAS OF UNSTABILIZED EARTH DISTURBING ACTIVITIES.

11. ADDITIONAL EROSION AND SEDIMENT CONTROL GENERAL PRACTICES:
   11.1. USE TEMPORARY MULCHING, PERMANENT MULCHING, TEMPORARY VEGETATIVE COVER, AND PERMANENT VEGETATIVE COVER TO REDUCE THE NEED FOR DUST CONTROL. USE MECHANICAL SWEEPERS ON PAVED SURFACES WHERE NECESSARY TO PREVENT DUST BUILDUP. APPLY WATER, OR OTHER DUST INHIBITING AGENTS OR TACKIFIERS, AS APPROVED BY THE NHDES.
   11.2. ALL STOCKPILES SHALL BE CONTAINED WITH TEMPORARY PERIMETER CONTROLS. INACTIVE SOIL STOCKPILES SHOULD BE PROTECTED WITH SOIL STABILIZATION MEASURES (TEMPORARY EROSION CONTROL SEED MIX AND MULCH, SOIL BINDER) OR COVERED WITH ANCHORED TARPS.
   11.3. EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSPECTED IN ACCORDANCE WITH SECTION 645 OF NHDOT SPECIFICATIONS, WEEKLY AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.25 IN. OF RAIN PER 24-HOUR PERIOD. EROSION AND SEDIMENT CONTROL MEASURES WILL ALSO BE INSPECTED IN ACCORDANCE WITH THE GUIDANCE MEMO FROM THE NHDES CONTAINED WITHIN THE CONTRACT PROPOSAL AND THE EPA CONSTRUCTION GENERAL PERMIT.
   11.4. THE CONTRACTOR SHOULD UTILIZE STORM DRAIN INLET PROTECTION TO PREVENT SEDIMENT FROM ENTERING A STORM DRAINAGE SYSTEM PRIOR TO THE PERMANENT STABILIZATION OF THE CONTRIBUTING DISTURBED AREA.
   11.5. PERMANENT STABILIZATION MEASURES WILL BE CONSTRUCTED AND MAINTAINED IN LOCATIONS AS SHOWN ON THE CONSTRUCTION PLANS TO STABILIZE AREAS. VEGETATIVE STABILIZATION SHALL NOT BE CONSIDERED PERMANENTLY STABILIZED UNTIL VEGETATIVE GROWTH COVERS AT LEAST 85% OF THE DISTURBED AREA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR EROSION AND SEDIMENT CONTROL FOR ONE YEAR AFTER PROJECT COMPLETION.
   11.6. CATCH BASINS: CARE SHALL BE TAKEN TO ENSURE THAT SEDIMENTS DO NOT ENTER ANY EXISTING CATCH BASINS DURING CONSTRUCTION. THE CONTRACTOR SHALL PLACE TEMPORARY STONE INLET PROTECTION OVER INLETS IN AREAS OF SOIL DISTURBANCE THAT ARE SUBJECT TO SEDIMENT CONTAMINATION.
   11.7. TEMPORARY AND PERMANENT DITCHES SHALL BE CONSTRUCTED, STABILIZED AND MAINTAINED IN A MANNER THAT WILL MINIMIZE SCOUR. TEMPORARY AND PERMANENT DITCHES SHALL BE DIRECTED TO DRAIN TO SEDIMENT BASINS OR STORM WATER COLLECTION AREAS.
   11.8. WINTER EXCAVATION AND EARTHWORK ACTIVITIES NEED TO BE LIMITED IN EXTENT AND DURATION, TO MINIMIZE POTENTIAL EROSION AND SEDIMENTATION IMPACTS. THE AREA OF EXPOSED SOIL SHALL BE LIMITED TO ONE ACRE, OR THAT WHICH CAN BE STABILIZED AT THE END OF EACH DAY UNLESS A WINTER CONSTRUCTION PLAN, DEVELOPED BY A QUALIFIED ENGINEER OR A CPESC SPECIALIST, IS REVIEWED AND APPROVED BY THE DEPARTMENT.
   11.9. CHANNEL PROTECTION MEASURES SHALL BE SUPPLEMENTED WITH PERIMETER CONTROL MEASURES WHEN THE DITCH LINES OCCUR AT THE BOTTOM OF LONG FILL SLOPES. THE PERIMETER CONTROLS SHALL BE INSTALLED ON THE FILL SLOPE TO MINIMIZE THE POTENTIAL FOR FILL SLOPE SEDIMENT DEPOSITS IN THE DITCH LINE.

BEST MANAGEMENT PRACTICES (BMP) BASED ON AMOUNT OF OPEN CONSTRUCTION AREA

12. STRATEGIES SPECIFIC TO OPEN AREAS LESS THAN 5 ACRES:
   12.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WQ 1500: ALTERATION OF TERRAIN FOR CONSTRUCTION AND USE ALL CONVENTIONAL BMP STRATEGIES.
   12.2. SLOPES STEEPER THAN 3:1 WILL RECEIVE TURF ESTABLISHMENT WITH MATTING.
   12.3. SLOPES 3:1 OR FLATTER WILL RECEIVE TURF ESTABLISHMENT ALONE.
   12.4. AREAS WHERE HAUL ROADS ARE CONSTRUCTED AND STORMWATER CANNOT BE TREATED THE DEPARTMENT WILL CONSIDER INFILTRATION.
   12.5. FOR HAUL ROADS ADJACENT TO SENSITIVE ENVIRONMENTAL AREAS OR STEEPER THAN 5%, THE DEPARTMENT WILL CONSIDER USING EROSION STONE, CRUSHED GRAVEL, OR CRUSHED STONE BASE TO HELP MINIMIZE EROSION ISSUES.
   12.6. ALL AREAS THAT CAN BE STABILIZED SHALL BE STABILIZED PRIOR TO OPENING UP NEW TERRITORY.
   12.7. DETENTION BASINS SHALL BE DESIGNED AND CONSTRUCTED TO ACCOMMODATE A 2 YEAR STORM EVENT.

13. STRATEGIES SPECIFIC TO OPEN AREAS BETWEEN 5 AND 10 ACRES:
   13.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WQ 1500 ALTERATION OF TERRAIN AND SHALL USE CONVENTIONAL BMP STRATEGIES AND ALL TREATMENT OPTIONS USED FOR UNDER 5 ACRES WILL BE UTILIZED.
   13.2. DETENTION BASINS WILL BE CONSTRUCTED TO ACCOMMODATE THE 2-YEAR 24-HOUR STORM EVENT AND CONTROL A 10-YEAR 24-HOUR STORM EVENT.
   13.3. SLOPES STEEPER THAN A 3:1 WILL RECEIVE TURF ESTABLISHMENT WITH MATTING OR OTHER TEMPORARY SOIL STABILIZATION MEASURES DETAILED IN TABLE 1. THE CONTRACTOR MAY ALSO CONSIDER A SOIL BINDER IN ACCORDANCE WITH THE NHDES APPROVALS OR REGULATIONS. OTHER ALTERNATIVE MEASURES, SUCH AS BONDED FIBER MATRIXES (BFMS) OR FLEXIBLE GROWTH MEDIUMS (FGMS) MAY BE UTILIZED, IF MEETING THE NHDES APPROVALS AND REGULATIONS.
   13.4. SLOPES 3:1 OR FLATTER WILL RECEIVE TURF ESTABLISHMENT OR OTHER TEMPORARY SOIL STABILIZATION MEASURES DETAILED IN TABLE 1. THE CONTRACTOR MAY ALSO CONSIDER A SOIL BINDER IN ACCORDANCE WITH THE NHDES APPROVALS OR REGULATIONS.

14. STRATEGIES SPECIFIC TO OPEN AREAS OVER 10 ACRES:
   14.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WQ 1500 ALTERATION OF TERRAIN AND SHALL USE CONVENTIONAL BMP STRATEGIES AND ALL TREATMENT OPTIONS USED FOR UNDER 5 ACRES AND BETWEEN 5 AND 10 ACRES WILL BE UTILIZED.
   14.2. THE DEPARTMENT ANTICIPATES THAT SOIL BINDERS WILL BE NEEDED ON ALL SLOPES STEEPER THAN 3:1, IN ORDER TO MINIMIZE EROSION AND REDUCE THE AMOUNT OF SEDIMENT IN THE STORMWATER TREATMENT BASINS.
   14.3. THE CONTRACTOR WILL BE REQUIRED TO HAVE AN APPROVED DESIGN IN ACCORDANCE WITH ENV-WQ 1506.12 FOR AN ACTIVE FLOCCULANT TREATMENT SYSTEM TO TREAT AND RELEASE WATER CAPTURED IN STORM WATER BASINS. THE CONTRACTOR SHALL ALSO RETAIN THE SERVICES OF AN ENVIRONMENTAL CONSULTANT WHO HAS DEMONSTRATED EXPERIENCE IN THE DESIGN OF FLOCCULANT TREATMENT SYSTEMS. THE CONSULTANT WILL ALSO BE RESPONSIBLE FOR THE IMPLEMENTATION AND MONITORING OF THE SYSTEM.

TABLE 1

GUIDANCE ON SELECTING TEMPORARY SOIL STABILIZATION MEASURES

APPLICATION AREAS	DRY MULCH METHODS				HYDRAULICALLY APPLIED MULCHES[2]				ROLLED EROSION CONTROL BLANKETS[3]			
	HMT	WC	SG	CB	HM	SMM	BFM	FRM	SNSB	DNSB	DNSCB	DNCB
SLOPES[1]												
STEEPER THAN 2:1	NO	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	YES
2:1 SLOPE	YES'	YES'	YES	YES	NO	NO	YES	YES	NO	YES	YES	YES
3:1 SLOPE	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	NO
4:1 SLOPE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO
WINTER STABILIZATION	4T/AC	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES
CHANNELS												
LOW FLOW CHANNELS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
HIGH FLOW CHANNELS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES

ABBREV.	STABILIZATION MEASURE	ABBREV.	STABILIZATION MEASURE	ABBREV.	STABILIZATION MEASURE
HMT	HAY MULCH & TACK	HM	HYDRAULIC MULCH	SNSB	SINGLE NET STRAW BLANKET
WC	WOOD CHIPS	SMM	STABILIZED MULCH MATRIX	DNSB	DOUBLE NET STRAW BLANKET
SG	STUMP GRINDINGS	BFM	BONDED FIBER MATRIX	DNSCB	2 NET STRAW-COCONUT BLANKET
CB	COMPOST BLANKET	FRM	FIBER REINFORCED MEDIUM	DNCB	2 NET COCONUT BLANKET

NOTES:
1. ALL SLOPE STABILIZATION OPTIONS ASSUME A SLOPE LENGTH ≤10 TIMES THE HORIZONTAL DISTANCE COMPONENT OF THE SLOPE, IN FEET.
2. PRODUCTS CONTAINING POLYACRYLAMIDE (PAM) SHALL NOT BE APPLIED DIRECTLY TO OR WITHIN 100 FEET OF ANY SURFACE WATER WITHOUT PRIOR WRITTEN APPROVAL FROM THE NH DEPARTMENT OF ENVIRONMENTAL SERVICES.
3. ALL EROSION CONTROL BLANKETS SHALL BE MADE WITH WILDLIFE FRIENDLY BIODEGRADABLE NETTING.

STATE OF NEW HAMPSHIRE
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EROSION CONTROL STRATEGIES

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
12-21-2015	15747erosstrat	15747	5	38

GENERAL NOTES:

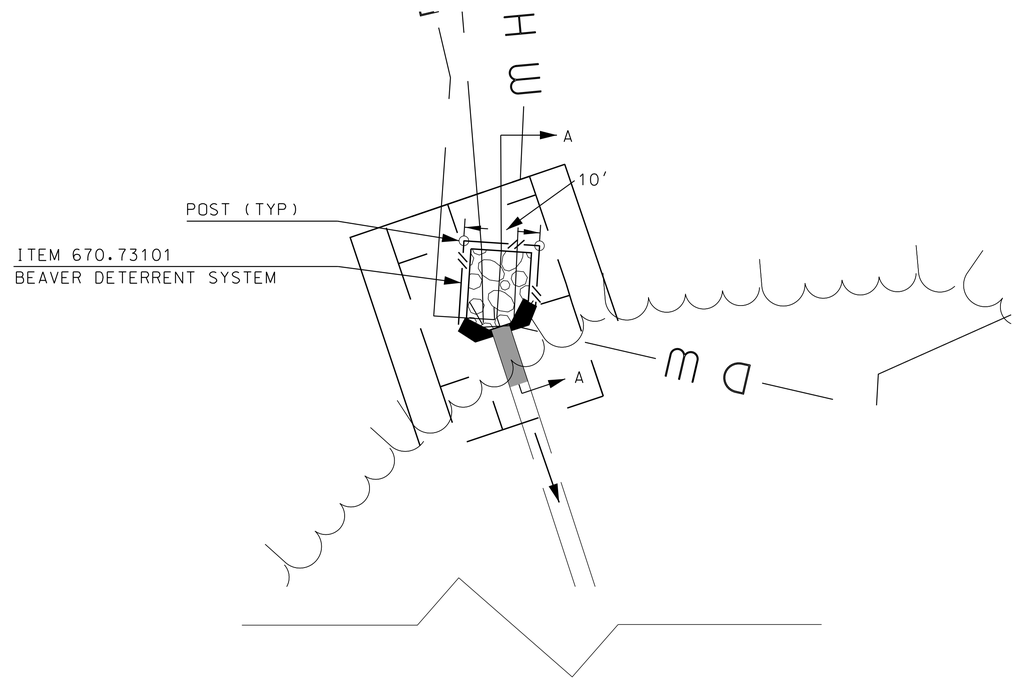
1. ATTACH ADDITIONAL SECTION OF FENCING TO FRONT AND FOLD INTO STREAMBED ENDING UNDER STONE FILL.

2. REFER TO STD FN-1 FOR INSTALLATION OF POST ASSEMBLIES & CORNER BRACES.

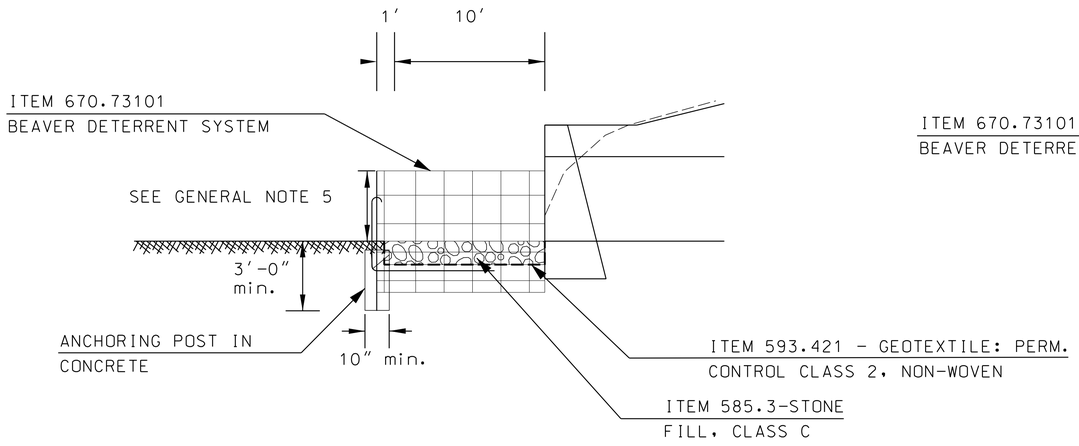
3. EMBED POSTS 3'-0" MIN. INTO STREAMBED WITH CONCRETE FILLED SONOTUBES.

4. BEAVER FENCE OPENING SHALL BE 6"X6".

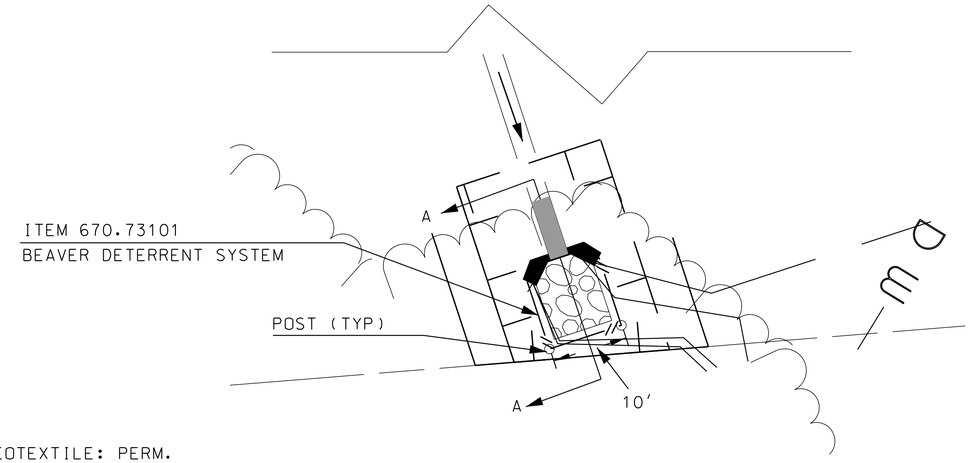
5. INSTALL TOP OF FENCE 15" ABOVE NATURAL BANK LINE (APPROX. 18"-24" ABOVE NORMAL WATER LINE).



BEAVER DETERRENT SYSTEM INLET
DRAINAGE NOTE 5N STA. 1147+00 NB LT



CROSS SECTION VIEW A - A
BEAVER DETERRENT SYSTEM



BEAVER DETERRENT SYSTEM OUTLET
DRAINAGE NOTE 5N STA. 1147+00 NB RT

NOT TO SCALE

REVISIONS AFTER PROPOSAL

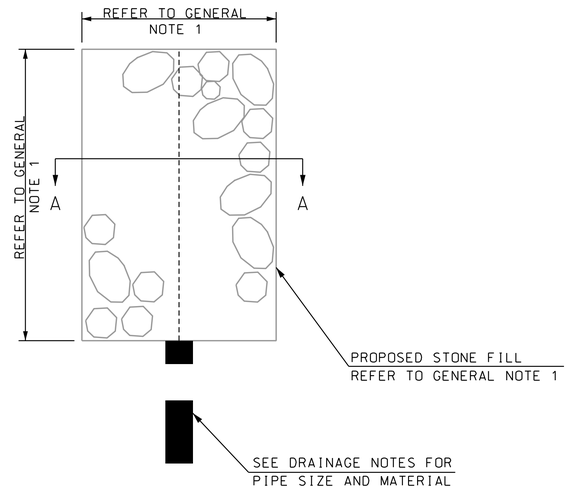
NUMBER	DATE	STATION	DESCRIPTION

		DATE
SDR PROCESSED		
NEW DESIGN	AWJ	03/23
SHEET CHECKED	DAM	03/23
AS BUILT DETAILS		

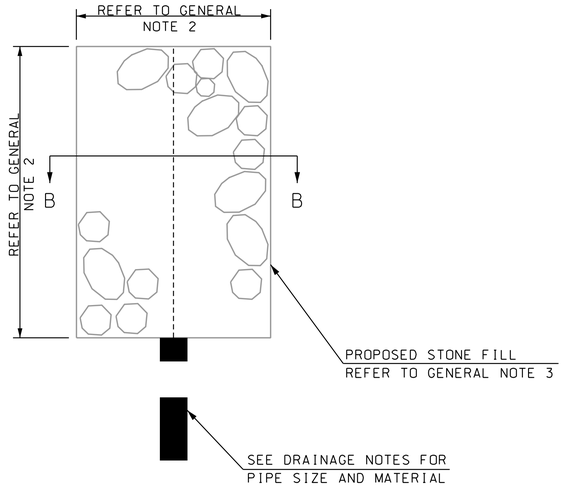
STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

DRAINAGE DETAILS
(SHEET 1 OF 3)

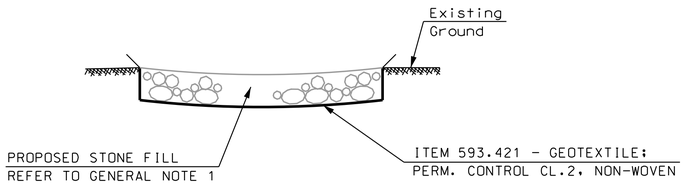
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15747DTL_BVRFNCE	15747	6	38

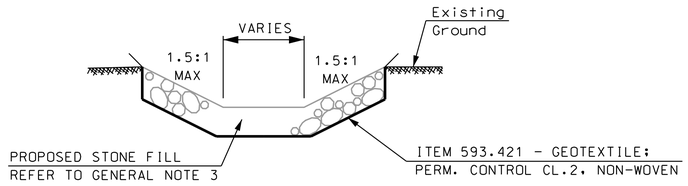


PLAN VIEW



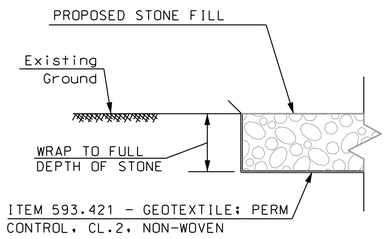
PLAN VIEW





INLET PROTECTION DETAIL

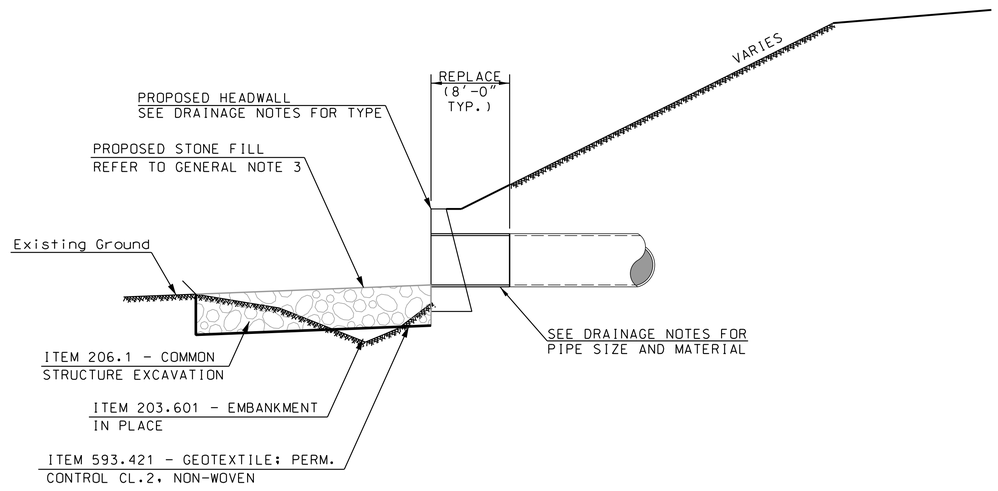
SECTION A-A



GEOTEXTILE DETAIL

OUTLET PROTECTION DETAIL

SECTION B-B



OUTLET PROTECTION
EXISTING PIPE CONNECTION

GENERAL NOTES:

1. REFER TO DRAINAGE NOTES FOR DIMENSIONS FOR INLET PROTECTION STONE FILL. STONE TO CONFORM TO SHAPE OF EXISTING INLET CHANNEL AND PLACED SUCH THAT WATER IS DIRECTED INTO CULVERT. STONE TO BE ITEM 585.3 - STONE FILL, CLASS C, PLACED AT 1' DEPTH.

2. TYPICAL OUTLET PROTECTION DIMENSIONS ARE BASED ON PIPE DIAMETER:
   A. IF PIPE DIAMETER IS ≤12", OUTLET PROTECTION DIMENSIONS WILL BE 10'L X 5'W.
   B. IF PIPE DIAMETER IS >12", OUTLET PROTECTION DIMENSIONS WILL BE 15'L x 10'W.

3. OUTLET PROTECTION STONE FILL IS SIZED AS FOLLOWS:
   A. ITEM 585.3 - STONE FILL, CLASS C, PLACED AT 1' DEPTH AT PIPES <36" DIAMETER.
   B. ITEM 585.2 - STONE FILL, CLASS B, PLACED AT 2' DEPTH AT:
      -PIPES WITH CIPP LINING
      -PIPES ≥36" DIAMETER

4. SEE DRAINAGE NOTES AND GENERAL PLANS FOR MORE INFORMATION, INCLUDING NON-TYPICAL OUTLET PROTECTION LAYOUTS.

NOT TO SCALE

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	STATION	DATE

SDR PROCESSED		DATE	
NEW DESIGN	AWJ	DATE	03/23
SHEET CHECKED	DAM	DATE	03/23
AS BUILT DETAILS		DATE	

STATE OF NEW HAMPSHIRE

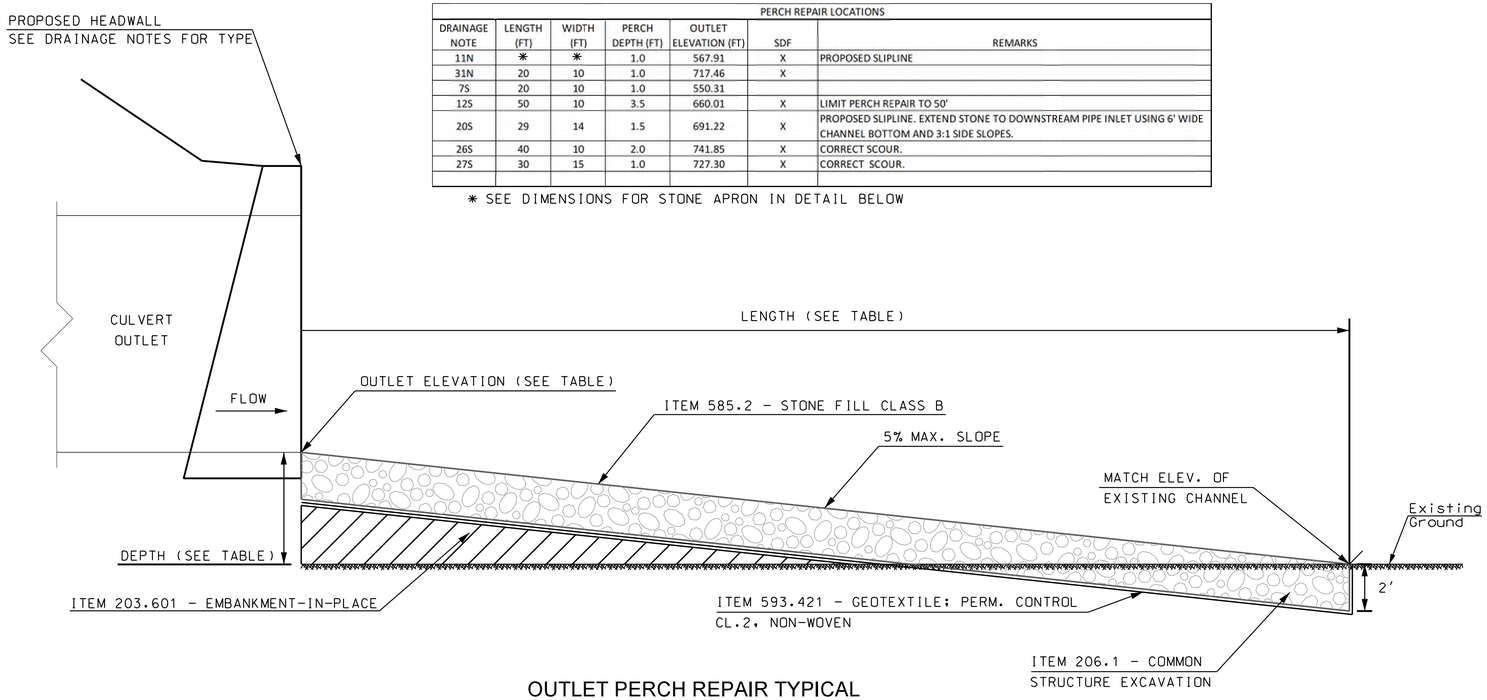
DEPARTMENT OF TRANSPORTATION ∘ BUREAU OF HIGHWAY DESIGN

DRAINAGE DETAILS
(SHEET 2 OF 3)

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15747DTL_DRN	15747	7	38

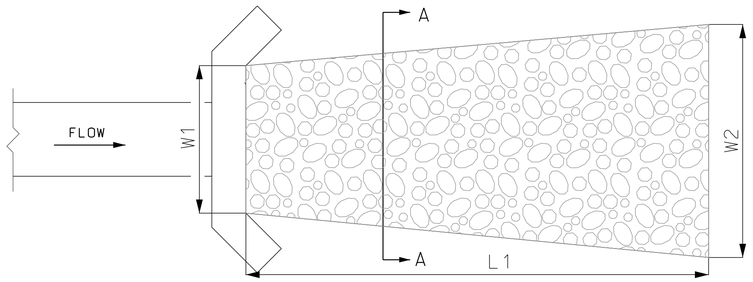
PERCH REPAIR LOCATIONS						
DRAINAGE NOTE	LENGTH (FT)	WIDTH (FT)	PERCH DEPTH (FT)	OUTLET ELEVATION (FT)	SDF	REMARKS
11N	*	*	1.0	567.91	X	PROPOSED SLIPLINE
31N	20	10	1.0	717.46	X	
7S	20	10	1.0	550.31		
12S	50	10	3.5	660.01	X	LIMIT PERCH REPAIR TO 50'
20S	29	14	1.5	691.22	X	PROPOSED SLIPLINE. EXTEND STONE TO DOWNSTREAM PIPE INLET USING 6' WIDE CHANNEL BOTTOM AND 3:1 SIDE SLOPES.
26S	40	10	2.0	741.85	X	CORRECT SCOUR.
27S	30	15	1.0	727.30	X	CORRECT SCOUR.

* SEE DIMENSIONS FOR STONE APRON IN DETAIL BELOW

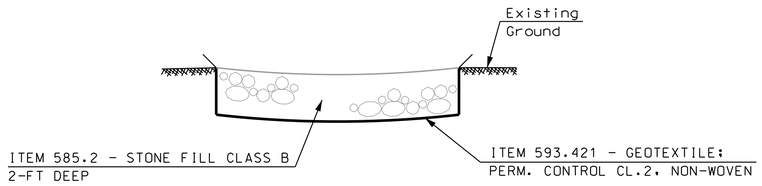


OUTLET PERCH REPAIR TYPICAL
NB DN 11N & 31N
SB DN 7S, 12S, 20S, 26S, & 27S

STONE APRON OUTLET PROTECTION DIMENSIONS							
OUTLET FROM	L1 (FT)	W1 (FT)	W2 (FT)	DEPTH (FT)	STONE CLASS	GEOTEXTILE (SY)	GEOTEXTILE CLASS
11N	34.0	7.5	42.0	2.0	B	121.4	593.421
15N	24.7	6.0	25.5	2.0	B	63.0	593.421
23S	28.0	7.5	18.0	2.0	B	59.6	593.421



PLAN VIEW



SECTION A-A

STONE APRON OUTLET PROTECTION DETAIL

NOT TO SCALE

GENERAL NOTES:

1. SEE DRAINAGE NOTES AND GENERAL PLANS FOR MORE INFORMATION, INCLUDING NON-TYPICAL OUTLET PROTECTION LAYOUTS.

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION

SDR PROCESSED		DATE
NEW DESIGN	AWJ	DATE 03/23
SHEET CHECKED	DAM	DATE 03/23
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STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

DRAINAGE DETAILS (SHEET 3 OF 3)

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15747DTL_DRN	15747	8	38

REVISIONS AFTER PROPOSAL

NUMBER	DATE	DESCRIPTION
		STATION
		STATION

SDR PROCESSED — DATE
NEW DESIGN — MMR — DATE 01/23
SHEET CHECKED — DAM — DATE 01/23
AS BUILT DETAILS — DATE

LEGEND

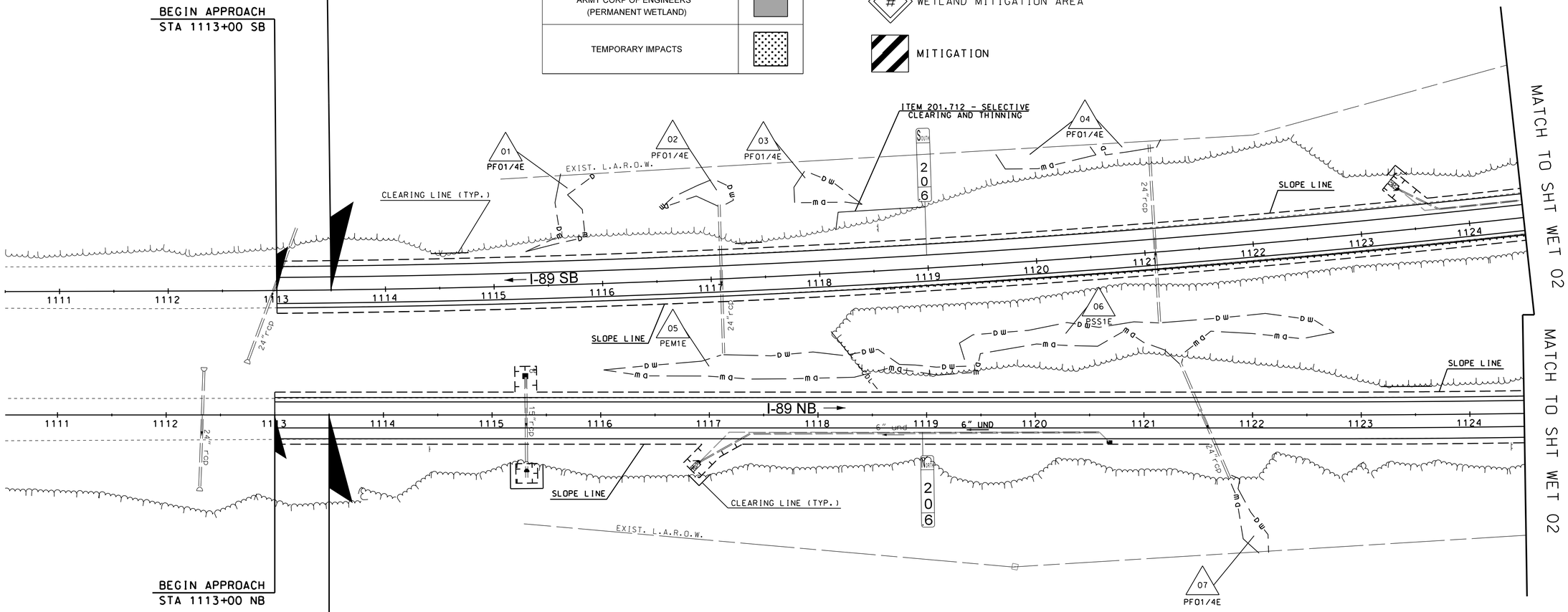
TYPE OF WETLAND IMPACT	SHADING/ HATCHING
NEW HAMPSHIRE WETLANDS BUREAU (PERMANENT NON-WETLAND)	
NEW HAMPSHIRE WETLANDS BUREAU & ARMY CORP OF ENGINEERS (PERMANENT WETLAND)	
TEMPORARY IMPACTS	

WETLAND DESIGNATION NUMBER
WETLAND IMPACT LOCATION
WETLAND MITIGATION AREA
MITIGATION

GRID

BEGIN CONSTRUCTION
STA 1113+50 SB

BEGIN APPROACH
STA 1113+00 SB



BEGIN APPROACH
STA 1113+00 NB

BEGIN CONSTRUCTION
STA 1113+50 NB

NO IMPACTS ON THIS SHEET

GENERAL NOTE: IMPACTS ASSOCIATED WITH CERTIFIED CULVERT MAINTAINER PROGRAM (CCMP) LABELS ARE SPECIFIC TO CCMP ACTIVITIES. THESE IMPACTS ARE NOT INCLUDED IN STANDARD DREDGE AND FILL (SDF) PERMITTING QUANTITIES AND ARE SHOWN FOR INFORMATIONAL PURPOSES. CCMP NOTIFICATIONS WILL BE SUBMITTED SEPARATELY AFTER THE SDF PERMIT PACKAGE HAS BEEN SUBMITTED TO DES.

50 0 50 100
SCALE IN FEET

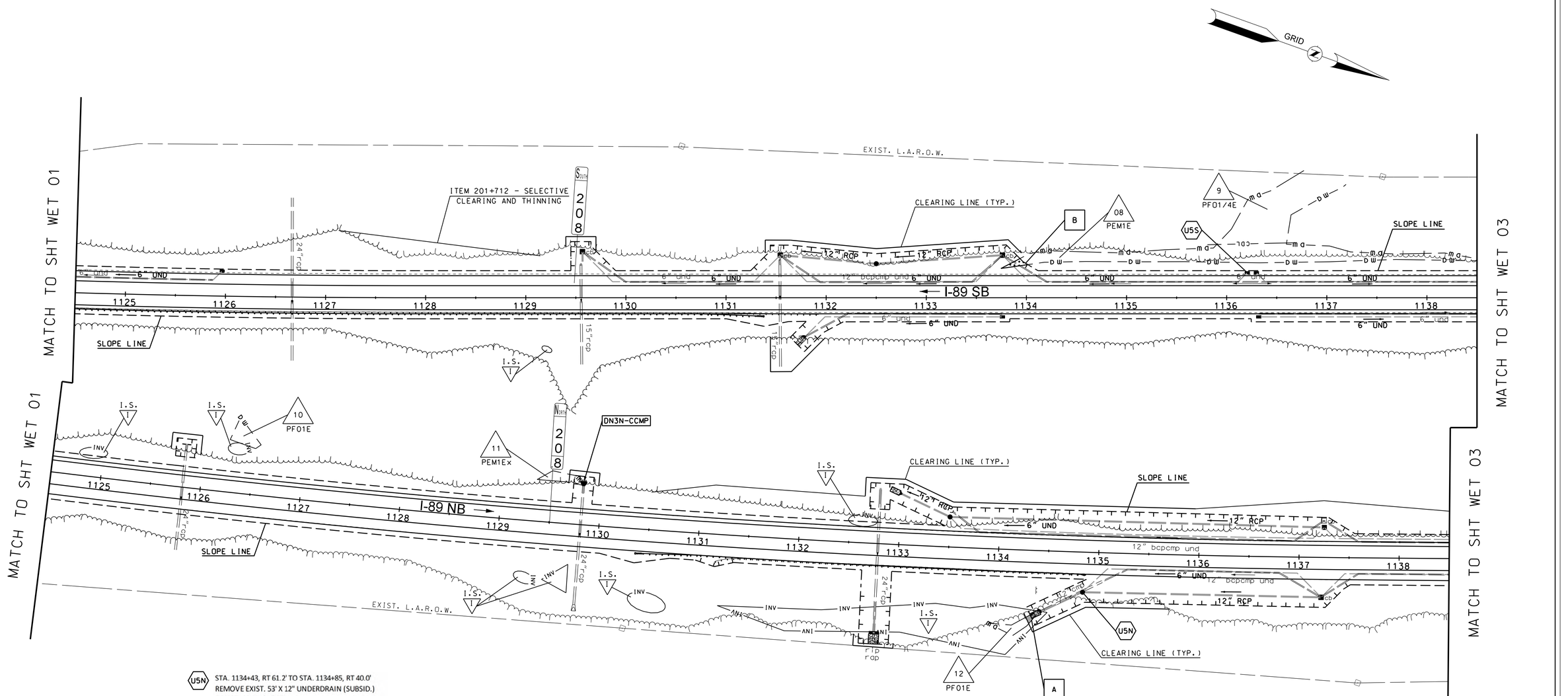
FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

WETLAND PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET01	15747wetplans	15747	9	38

U5S STA. 1133+76, LT 42.5' TO STA. 1136+21, LT 25.0'
REMOVE EXIST. 53' X 6" UNDERDRAIN
REMOVE EXIST. 202' X 6" UNDERDRAIN (SUBSID.)
CONST. 258' X 6" PERF. CORR. POLY. PIPE UNDERDRAIN
CONST. FLUSHING BASIN AT +21, LT 25.0'



U5N STA. 1134+43, RT 61.2' TO STA. 1134+85, RT 40.0'
REMOVE EXIST. 53' X 12" UNDERDRAIN (SUBSID.)
CONST. 45' X 12" RCP
INV. AT OUTLET = 531.00'
CONST. UL-2 HEADWALL AT +43, RT 61.2'
CONST. 5' W X 10' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. 4' DIA. DMH AT +85, RT 40'
COVER = 537.00'
INV. OUT = 531.75'
INV. IN (12") = 532.00'

50 0 50 100
SCALE IN FEET

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION

SDR PROCESSED		DATE
NEW DESIGN	MMR	DATE 01/23
SHEET CHECKED	DAM	DATE 01/23
AS BUILT DETAILS		DATE

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

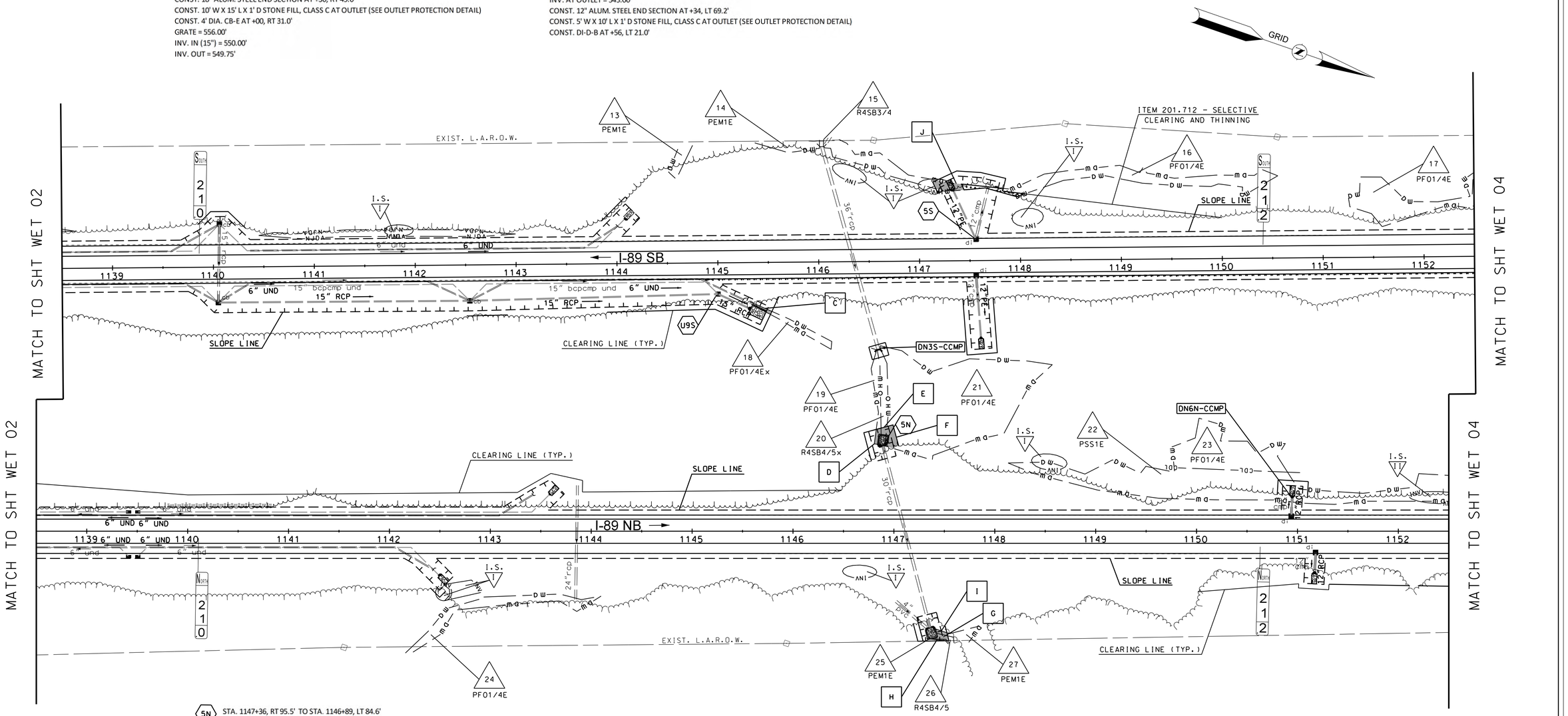
WETLAND PLANS

FUSS & O'NEILL

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET02	15747wetplans	15747	10	38

U9S STA. 1145+30, RT 45.0' TO STA. 1145+00, RT 31.0'
REMOVE EXIST. 28' X 6" UNDERDRAIN
REMOVE EXIST. HEADWALL AT STA. 1145+25, RT 36.5'
CONST. 31' X 15" RCP
INV. AT OUTLET = 549.50'
CONST. 18" ALUM. STEEL END SECTION AT +30, RT 45.0'
CONST. 10' W X 15' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. 4' DIA. CB-E AT +00, RT 31.0'
GRATE = 556.00'
INV. IN (15") = 550.00'
INV. OUT = 549.75'

5S STA. 1147+34, LT 69.2' TO STA. 1147+56, LT 21.0'
REMOVE EXIST. 53' X 12" CMP
REMOVE EXIST. END SECTION AT +68, LT 72.0'
REMOVE EXIST. DI AT +56, LT 21.0' (SUBSID.)
CONST. 53' X 12" CORR. POLY. PIPE FOR SLOPE DRAINAGE
INV. AT OUTLET = 545.00'
CONST. 12" ALUM. STEEL END SECTION AT +34, LT 69.2'
CONST. 5' W X 10' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. DI-D-B AT +56, LT 21.0'



5N STA. 1147+36, RT 95.5' TO STA. 1146+89, LT 84.6'
REMOVE EXIST. 8' x 30" RCP AT OUTLET (SUBSID.)
REMOVE EXIST. MRM HEADWALL AT +36, RT 95.5'
REMOVE EXIST. BEAVER DETERRENT MEASURES AT OUTLET (SUBSID.)
REMOVE EXIST. 8' x 30" RCP AT INLET (SUBSID.)
REMOVE EXIST. MRM HEADWALL AT +89, LT 84.6'
REMOVE EXIST. BEAVER DETERRENT MEASURES AT INLET (SUBSID.)
CONST. 8' x 30" RCP AT OUTLET
CONST. PC-7 HEADWALL AT +36, RT 95.5'
CONST. 8' W X 10' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. BEAVER DETERRENT SYSTEM AT OUTLET
CONST. 8' x 30" RCP AT INLET
CONST. PC-7 HEADWALL AT +89, LT 84.6'
CONST. 8' W X 10' L X 1' D STONE FILL, CLASS C AT INLET (SEE OUTLET PROTECTION DETAIL)
CONST. BEAVER DETERRENT SYSTEM AT INLET

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

WETLAND PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET03	15747wetplans	15747	11	38

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	DATE	STATION

SDR PROCESSED		DATE	
NEW DESIGN	MMR	DATE	01/23
SHEET CHECKED	DAM	DATE	01/23
AS BUILT DETAILS		DATE	


GRID
MATCH TO SHT WET 03
MATCH TO SHT WET 05
MACHINE SCALING LIMIT
CLEARING LINE (TYP.)
SLOPE LINE
EXIST. L.A.R.O.W.
I-89 SB
I-89 NB
1153
1154
1155
1156
1157
1158
1159
1160
1161
1162
1163
1164
1165
1166
DN6S-CCMP
DN7S-CCMP
DNU13S-CCMP
DN8S-CCMP
DN8N-CCMP
DNU10N-CCMP
17 PFO1/4E
28 R4SB4/5
29 PFO1/4E
30 PFO1/4E
31 R4SB3/4
32 PFO1/4E
33 PEM1E
34 PFO1/4E
35 PEM1E
36 PFO1/4E
37 PFO1/4E
38 PEM1Ex
39 PFO1/4E
40 PFO1/4E
41 PFO1/4E
42 PFO1/4E
43 PFO1/4E
44 PFO1/4E
45 PFO1/4E
46 PEM1Ex
47 PFO1/4E
48 PFO1/4E
49 PFO1/4E
50 PFO1/4E
51 PFO1/4E
52 PFO1/4E
22 PSS1E
I.S. I
I.S. II
K
L
M
N
6" UND
24"rcp
36"rcp
SOUTH 214
NORTH 214

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

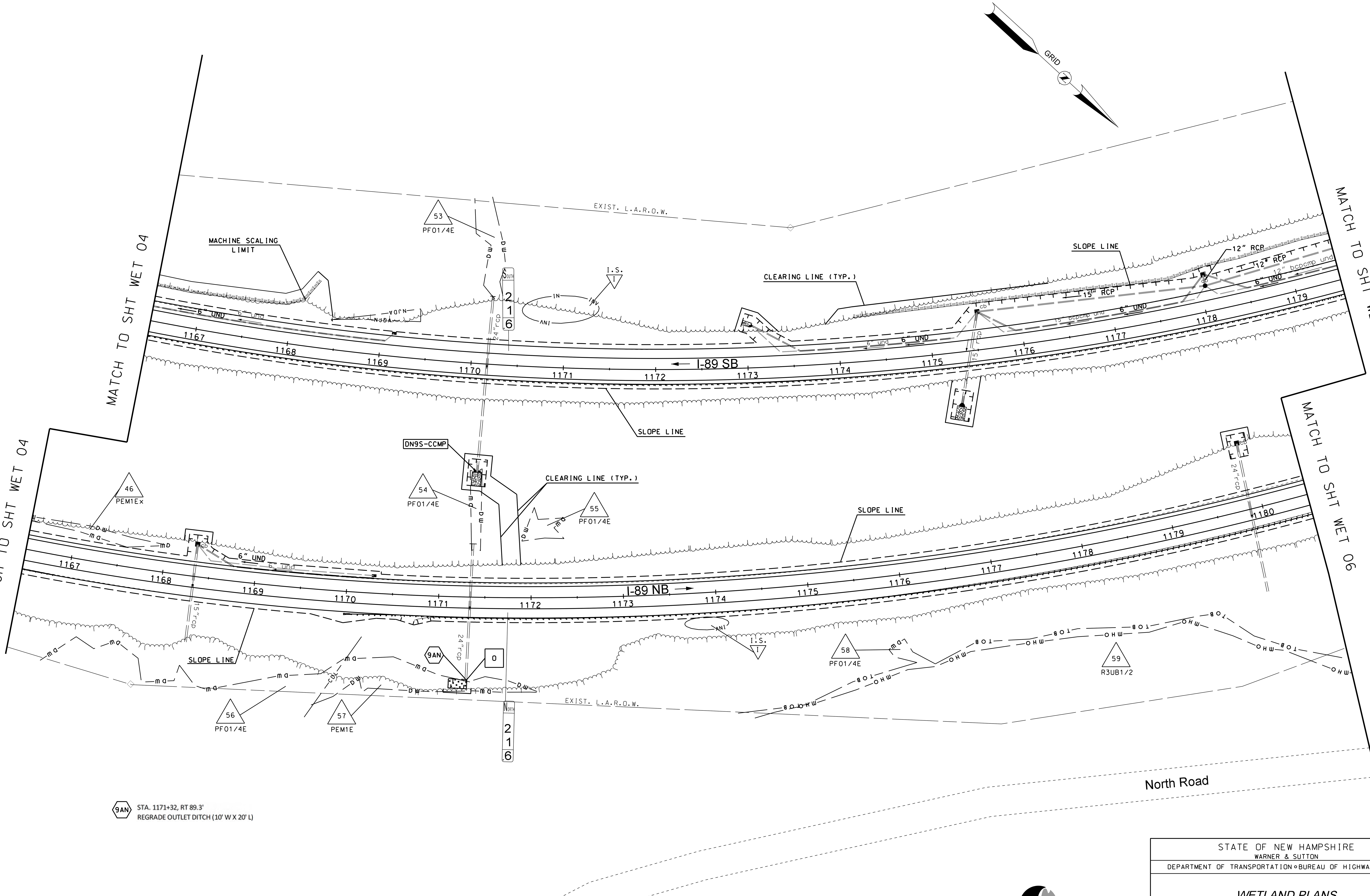
WETLAND PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET04	15747wetplans	15747	12	38

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED		DATE
NEW DESIGN	MMR	DATE 01/23
SHEET CHECKED	DAM	DATE 01/23
AS BUILT DETAILS		DATE


GRID
MATCH TO SHT WET 04
MATCH TO SHT WET 04
MATCH TO SHT WET 06
MATCH TO SHT WET 06
EXIST. L.A.R.O.W.
EXIST. L.A.R.O.W.
MACHINE SCALING LIMIT
CLEARING LINE (TYP.)
CLEARING LINE (TYP.)
SLOPE LINE
SLOPE LINE
SLOPE LINE
SLOPE LINE
I-89 SB
I-89 NB
DN9S-CCMP
53 PF01/4E
54 PF01/4E
55 PF01/4E
46 PEM1Ex
56 PF01/4E
57 PEM1E
58 PF01/4E
59 R3UB1/2
I.S. 1
I.S. 1
9AN
0
6" UND
12" RCP
15" RCP
24"rcp
15"rcp
216
North Road
SCALE IN FEET

9AN STA. 1171+32, RT 89.3'
REGRADE OUTLET DITCH (10' W X 20' L)

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED DATE
NEW DESIGN MMR DATE 01/23
SHEET CHECKED DAM DATE 01/23
AS BUILT DETAILS DATE

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

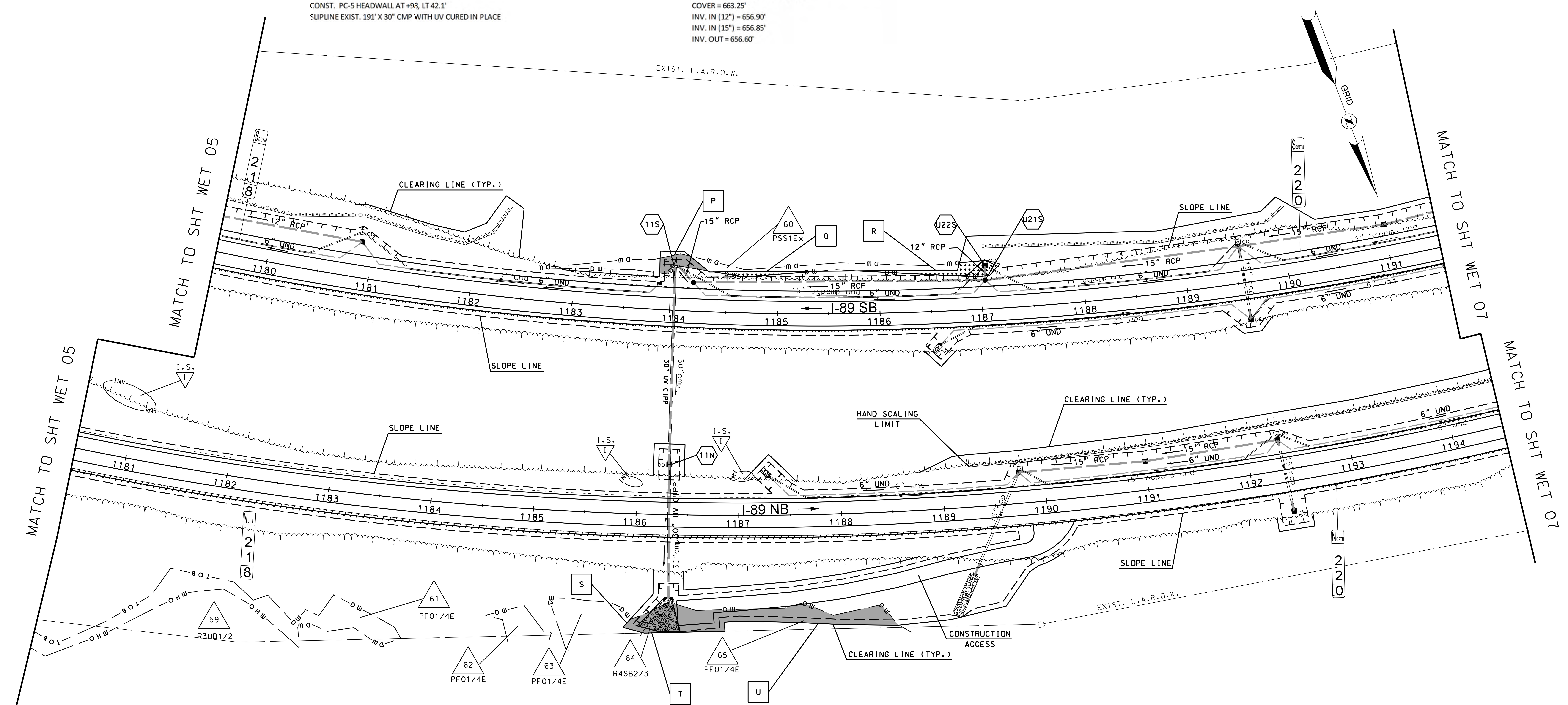
WETLAND PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET05	15747wetplans	15747	13	38

(11S) STA. 1184+03, RT 149.9' TO STA. 1183+98, LT 42.1'
REMOVE EXIST. 8' X 30" CMP AT OUTLET (SUBSID.)
REMOVE EXIST. 8' X 30" CMP AT INLET (SUBSID.)
REMOVE EXIST. MRM HEADWALL AT +98, LT 42.1'
CONST. 8' X 30" CMP AT OUTLET (AS NEEDED FOR CB INSTALL.)
CONST. 8' X 30" CMP AT INLET
CONST. PC-5 HEADWALL AT +98, LT 42.1'
SLIPLINE EXIST. 191' X 30" CMP WITH UV CURED IN PLACE

(U21S) STA. 1184+17, LT 28.0' TO STA. 1187+04, LT 28.0'
REMOVE EXIST. 59' X 15" UNDERDRAIN
REMOVE EXIST. 224' X 15" UNDERDRAIN (SUBSID.)
CONST. 279' X 15" RCP
CONST. 290' X 6" PERF. CORR. POLY. PIPE UNDERDRAIN
CONST 6' DIA. DMH AT +04, LT 28.0'
COVER = 663.25'
INV. IN (12") = 656.90'
INV. IN (15") = 656.85'
INV. OUT = 656.60'

(U22S) STA. 1187+04, LT 28.0' TO STA. 1187+05, LT 42.1'
REMOVE EXIST. CB AT +05, LT 42.1' (SUBSID.)
CONST. 10' X 12" RCP
CONST. 4' DIA. CB-E AT +05, LT 42.1' (REQUIRES SLAB TOP)
GRATE = 661.10'
INV. OUT = 657.00'



(11N) STA. 1186+33, RT 81.2' TO STA. 1186+31, LT 49.0'
REMOVE EXIST. 8' X 30" CMP AT OUTLET (SUBSID.)
REMOVE EXIST. MRM HEADWALL AT +33, RT 81.2'
REMOVE EXIST. 8' X 30" CMP AT INLET (SUBSID.)
REMOVE EXIST. CB AT +31, LT 49.0' (SUBSID.)
CONST. 8' X 30" CMP AT OUTLET
CONST. PC-5 HEADWALL AT +33, RT 81.2'
CONST. STONE FILL, CLASS B APRON AT OUTLET (SEE STONE APRON OUTLET PROTECTION DETAIL)
SLIPLINE EXIST. 128' X 30" CMP WITH UV CURED IN PLACE
CONST. 8' X 30" CMP AT INLET (AS NEEDED FOR CB INSTALL.)
CONST. 4' DIA. CB-E AT +31, LT 49.0'

SCALE IN FEET: 50 0 50 100

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

WETLAND PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET06	15747wetplans	15747	14	38

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED		DATE
NEW DESIGN	MMR	DATE 01/23
SHEET CHECKED	DAM	DATE 01/23
AS BUILT DETAILS		DATE

U25S STA. 1191+00, LT 33.0' TO STA. 1192+53, LT 37.0'
REMOVE EXIST. CB AT STA. 1192+53, LT 42.2' (SUBSID.)
CONST. 148' X 12" RCP
CONST. 4' DIA. CB-E AT +53, LT 37.0' (REQUIRES SLAB TOP) (SEE CATCH BASIN RELOCATION DETAIL)
GRATE = 672.50'
INV. OUT = 668.50'

12S STA. 1197+81, RT 56.8' TO STA. 1198+26, LT 66.4'
REMOVE EXIST. 16' X 24" RCP AT INLET (SUBSID.)
REMOVE EXIST. HEADWALL AT +26, LT 66.4'
CONST. STONE FILL, CLASS B AT OUTLET TO ELIMINATE PERCH (SEE OUTLET PERCH REPAIR DETAIL)
CONST. 16' X 24" RCP AT INLET
CONST. PC-3 HEADWALL AT +26, LT 66.4'
CONST. 10' W X 5' L X 1' D STONE FILL, CLASS C AT INLET (SEE INLET PROTECTION DETAIL)

U29S STA. 1207+78, LT 43.7' TO STA. 1205+28, LT 42.0'
REMOVE EXIST. 270' X 12" UNDERDRAIN (SUBSID.)
REMOVE EXIST. CB AT +28, LT 42.0' (SUBSID.)
CONST. 269' X 12" PERF. CORR. POLY. PIPE UNDERDRAIN
CONST. 4' DIA. CB-E AT +28, LT 42.0' (REQUIRES SLAB TOP)

U30S STA. 1205+28, LT 42.0' TO STA. 1203+07, LT 25.0'
REMOVE EXIST. 226' X 6" UNDERDRAIN (SUBSID.)
CONST. 235' X 6" PERF. CORR. POLY. PIPE UNDERDRAIN
CONST. FLUSHING BASIN AT +07, LT 25.0'

15N STA. 1199+80, RT 85.0 TO STA. 1199+73, LT 47.2'
REMOVE EXIST. 24' X 24" CMP AT OUTLET (SUBSID.)
REMOVE EXIST. 8' X 24" CMP AT INLET (SUBSID.)
REMOVE EXIST. HEADWALL AT +73, LT 47.2'
CONST. 16' X 24" CMP AT OUTLET
CONST. PC-1 HEADWALL AT +80, RT 85.0'
CONST. STONE FILL, CLASS B APRON AT OUTLET (SEE STONE APRON OUTLET PROTECTION DETAIL)
CONST. 8' X 24" CMP AT INLET
CONST. PC-5 HEADWALL AT +73, LT 47.2'
CONST. 10' W X 15' L X 1' D STONE FILL, CLASS C AT INLET (SEE INLET PROTECTION DETAIL)
SLIPLINE EXIST. 133' X 24" CMP WITH UV CURED IN PLACE

16N STA. 1202+76, RT 74.0' TO STA. 1202+76, LT 35.7
REMOVE EXIST. 8' X 15" RCP AT INLET (SUBSID.)
REMOVE EXIST. CB AT +76, LT 35.7' (SUBSID.)
CONST. 8' X 15" RCP AT OUTLET
INV. AT OUTLET = FIELD VERIFY
CONST. 10' W X 20' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. 8' X 15" RCP AT INLET (AS NEEDED FOR CB INSTALL.)
CONST. 4' DIA. CB-E AT +76, LT 35.7'

17N STA. 1205+84, RT 50.6' TO STA. 1205+85, LT 35.6'
REMOVE EXIST. 8' X 15" RCP AT OUTLET (SUBSID.)
REMOVE EXIST. HEADWALL AT +84, RT 50.6
REMOVE EXIST. 8' X 15" RCP AT INLET (SUBSID.)
REMOVE EXIST. CB AT +85, LT 35.6' (SUBSID.)
CONST 8' X 15" RCP AT OUTLET
CONST. PC-7 HEADWALL AT +84, RT 50.6'
CONST. 10' W X 15' L x 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. 8' X 15" RCP AT INLET (AS NEEDED FOR CB INSTALL.)
CONST. 4' DIA. CB-E AT +85, LT 35.6'

U17N STA. 1199+76, LT 48.3' TO STA. 1202+76, LT 35.7'
REMOVE EXIST. 263' X 6" UNDERDRAIN
REMOVE EXIST. 10' X 6" UNDERDRAIN (SUBSID.)
REMOVE EXIST. HEADWALL AT 1199+92, LT 36.0'
CONST. 317' X 6" PERF. CORR. POLY. PIPE UNDERDRAIN
INV. AT OUTLET = 626.0' (IN WINGWALL)

U18N STA. 1202+76, LT 35.7' TO STA. 1205+85, LT 35.6'
REMOVE EXIST. 267' X 6" UNDERDRAIN
REMOVE EXIST. 26' X 6" UNDERDRAIN (SUBSID.)
CONST. 320' X 6" PERF. CORR. POLY. PIPE UNDERDRAIN

U20N STA. 1205+86, RT 51.7' TO STA. 1208+04, RT 25.0'
REMOVE EXIST. 40' X 6" UNDERDRAIN
REMOVE EXIST. 190' X 6" UNDERDRAIN (SUBSID.)
REMOVE EXIST. HEADWALL AT 1205+89, RT 58.0' (SUBSID.)
CONST. 236' X 6" PERF. CORR. POLY. PIPE UNDERDRAIN
INV. AT OUTLET = 637.50' (IN WINGWALL)
CONST. FLUSHING BASIN AT +04, RT 25.0'

U21N STA. 1205+85, LT 35.6' TO STA. 1209+05, LT 19.0'
REMOVE EXIST. 297' X 6" UNDERDRAIN
REMOVE EXIST. 29' X 6" UNDERDRAIN (SUBSID.)
CONST. 325' X 6" PERF. CORR. POLY. PIPE UNDERDRAIN
CONST. FLUSHING BASIN AT +05, LT 19.0'

MATCH TO SHT WET 06

MATCH TO SHT WET 08

TOWN OF SUTTON
TOWN OF WARNER

I-89 SB

I-89 NB

EXIST. L.A.R.O.W.

CLEARING LINE (TYP.)

SLOPE LINE

HAND SCALING LIMIT

CONSTRUCTION ACCESS

GRID

SCALE IN FEET 50 0 50 100

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

WETLAND PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET07	15747wetplans	15747	15	38

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	DATE	STATION

SDR PROCESSED DATE
NEW DESIGN MMR DATE 01/23
SHEET CHECKED DAM DATE 01/23

AS BUILT DETAILS DATE

13S STA. 1207+78, RT 48.3' TO STA. 1207+78, LT 43.7'
REMOVE EXIST. 8' X 15" RCP AT OUTLET (SUBSID.)
REMOVE EXIST. 8' X 15" RCP AT INLET (SUBSID.)
REMOVE EXIST. CB AT +78, LT 43.7' (SUBSID.)
CONST. 8' X 15" RCP AT OUTLET
CONST. PC-7 HEADWALL AT +78, RT 48.3'
CONST. 10' W X 15' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. 8' X 15" RCP AT INLET (AS NEEDED FOR CB INSTALL)
CONST. 4' DIA. CB-E AT +78, LT 43.7' (REQUIRES SLAB TOP)

17S STA. 1216+65, RT 86.0' TO STA. 1216+65, RT 15.0'
REMOVE EXIST. 14' X 12" CMP (SUBSID.)
REMOVE EXIST. 62' X 12" CMP
REMOVE EXIST. CB AT 1216+77, RT 14.5'
CONST. 78' X 12" CORR. POLY. PIPE FOR SLOPE DRAINAGE
INV. AT OUTLET = 662.00'
CONST. 12" ALUM. STEEL END SECTION AT +65, RT 86.0'
CONST. 5' W X 4' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. DI-D-F AT +65, RT 15.0'

18S STA 1216+78, RT 84.0'
REMOVE EXIST. 8' X 24" RCP (SUBSID.)
CONST. PC-3 HEADWALL AT +78, RT 84.0'
CONST. EMBANKMENT TO CORRECT EROSION ABOVE PIPE
CONST. 10' W X 65' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
OUTLET PROTECTION TO FOLLOW EXIST. CHANNEL ALIGNMENT

MATCH TO SHT WET 07

MATCH TO SHT WET 09

STEVENS BROOK ROAD

EXIST. R.O.W.

EXIST. L.A.R.O.W.

CLEARING LINE (TYP.)

SLOPE LINE

GRASS TREATMENT SWALE (BMP 1210)

ITEM 201.22 - REMOVING LARGE TREES (3)

BR. NO. 192/057

BR. NO. 191/058

I-89 SB

I-89 NB

DN21N-CCMP

DN20N-CCMP

24"rcp

12"rcp

15" RCP

6" UND

HAND SCALING LIMIT

GRID

SCALE IN FEET 50 0 50 100

FUSS & O'NEILL

SDR PROCESSED		DATE
NEW DESIGN	MMR	DATE 01/23
SHEET CHECKED	DAM	DATE 01/23
AS BUILT DETAILS		DATE

NUMBER	DATE	STATION	DESCRIPTION

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

WETLAND PLANS

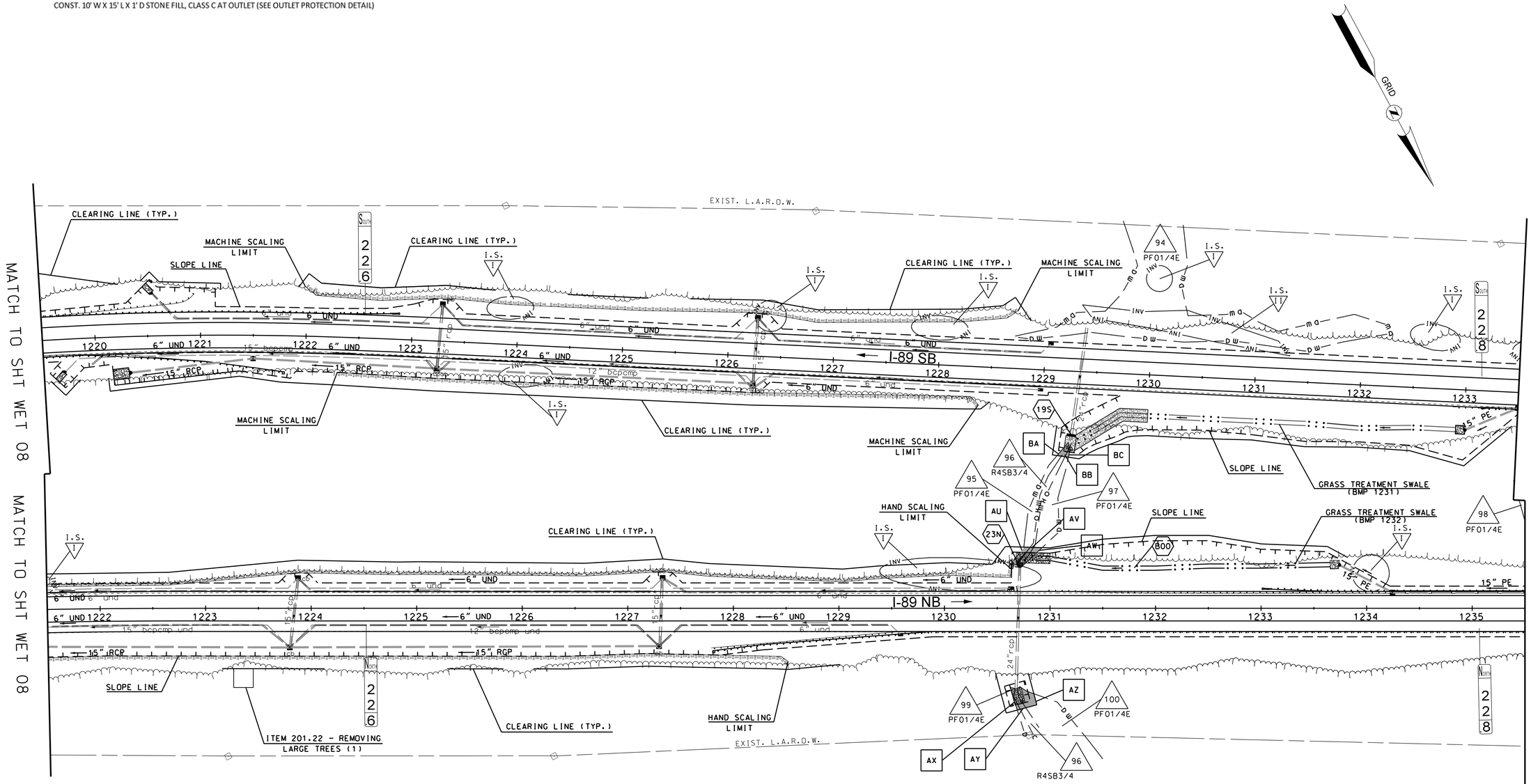
MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET08	15747wetplans	15747	16	38

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	STATION	DATE

SDR PROCESSED DATE
NEW DESIGN MMR DATE 01/23
SHEET CHECKED DAM DATE 01/23
AS BUILT DETAILS DATE

19S STA. 1229+29, RT 61.7'
REMOVE EXIST. 8' X 24" RCP (SUBSID.)
CONST. PC-3 HEADWALL AT +29, RT 61.7'
CONST. 10' W X 15' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)



23N STA. 1230+68, RT 76.1' TO STA. 1230+71, LT 38.8'
REMOVE EXIST. 8' x 24" RCP AT INLET (SUBSID.)
CONST. 10' W X 15' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. 8' X 24" RCP AT INLET
CONST. 30° ALUM. STEEL END SECTION AT +71, LT 38.8'

800 STA 1231+00, LT 47.0' TO STA 1233+65, LT 41.3'
CONST. 266' GRASS TREATMENT SWALE (SEE GRASS TREATMENT SWALE (BMP 1232) DETAILS)
CONST. 10' W X 32' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

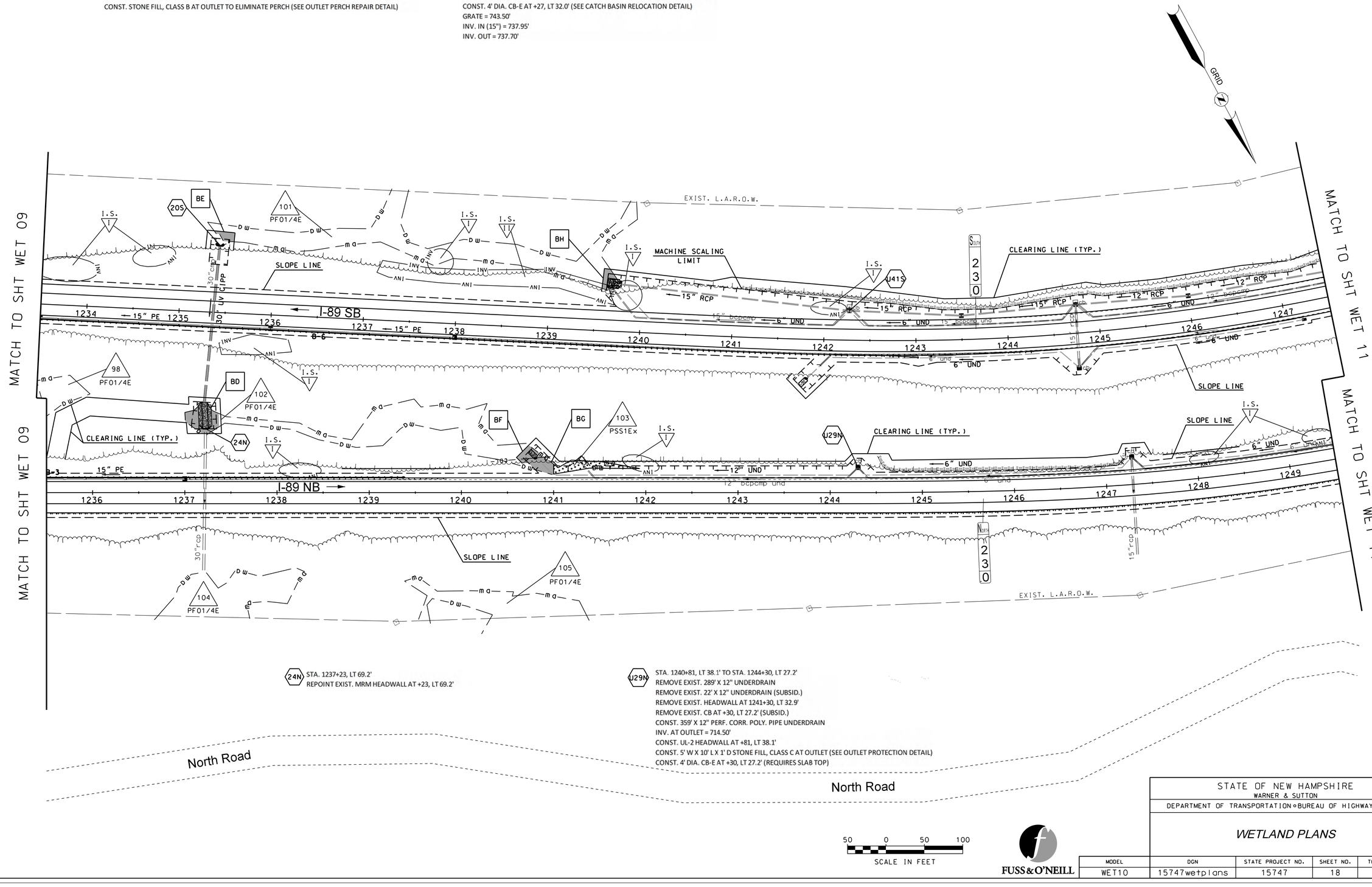
STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

WETLAND PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET09	15747wetplans	15747	17	38

20S STA. 1235+32, RT 97.2' TO STA. 1235+41, LT 72.9'
REMOVE EXIST. 16' X 30" CMP AT INLET (SUBSID.)
REMOVE EXIST. HEADWALL AT +41, LT 72.9'
CONST. 16' X 30" CMP AT INLET
CONST. PC-5 HEADWALL AT +41, LT 72.9'
SLIPLINE EXIST. 170' X 30" CMP WITH UV CURED IN PLACE
CONST. STONE FILL, CLASS B AT OUTLET TO ELIMINATE PERCH (SEE OUTLET PERCH REPAIR DETAIL)

U41S STA. 1239+77, LT 51.2' TO STA. 1242+27, LT 32.0'
REMOVE EXIST. CB AT +27, LT 35.9' (SUBSID.)
CONST. 247' X 15" RCP
INV. AT OUTLET = 731.45'
CONST. PC-7 HEADWALL AT +77, LT 51.2'
CONST. 10' W X 15' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. 4' DIA. CB-E AT +27, LT 32.0' (SEE CATCH BASIN RELOCATION DETAIL)
GRATE = 743.50'
INV. IN (15") = 737.95'
INV. OUT = 737.70'



24N STA. 1237+23, LT 69.2'
REPOINT EXIST. MRM HEADWALL AT +23, LT 69.2'

U29N STA. 1240+81, LT 38.1' TO STA. 1244+30, LT 27.2'
REMOVE EXIST. 289' X 12" UNDERDRAIN
REMOVE EXIST. 22' X 12" UNDERDRAIN (SUBSID.)
REMOVE EXIST. HEADWALL AT 1241+30, LT 32.9'
REMOVE EXIST. CB AT +30, LT 27.2' (SUBSID.)
CONST. 359' X 12" PERF. CORR. POLY. PIPE UNDERDRAIN
INV. AT OUTLET = 714.50'
CONST. UL-2 HEADWALL AT +81, LT 38.1'
CONST. 5' W X 10' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. 4' DIA. CB-E AT +30, LT 27.2' (REQUIRES SLAB TOP)

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

WETLAND PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET10	15747wetplans	15747	18	38

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	DATE	STATION

		DATE
SDR PROCESSED		
NEW DESIGN	MMR	DATE 01/23
SHEET CHECKED	DAM	DATE 01/23
AS BUILT DETAILS		DATE

23S STA. 1260+76, RT 78.2' TO STA. 1261+20, LT 48.8'
REMOVE EXIST. 8' x 24" CMP AT OUTLET (SUBSID.)
REMOVE EXIST. MRM HEADWALL AT +76, RT 78.2'
REMOVE EXIST. END SECTION AT +20, LT 48.8' (SUBSID.)
CONST. 8' X 24" CMP AT OUTLET
CONST. PC-1 HEADWALL AT +76, RT 78.2'
SLIPLINE EXIST. 135' X 24" CMP WITH UV CURED IN PLACE
CONST. STONE FILL, CLASS B APRON AT OUTLET (SEE STONE APRON OUTLET PROTECTION DETAIL)
CONST. 24" ALUM. STEEL END SECTION AT +20, LT 48.8'
CONST. 10' W X 5' L X 1' D STONE FILL, CLASS C AT INLET (SEE INLET PROTECTION DETAIL)

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

REVISIONS AFTER PROPOSAL				
NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED		DATE
NEW DESIGN	MMR	DATE 01/23
SHEET CHECKED	DAM	DATE 01/23
AS BUILT DETAILS		DATE

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

WETLAND PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET11	15747wetplans	15747	19	38

U52S STA. 1262+00, LT 38.1' TO STA. 1263+79, LT 40.1'
REMOVE EXIST. 198' X 12" UNDERDRAIN (SUBSID.)
REMOVE EXIST. HEADWALL AT +00, LT 38.1' (SUBSID.)
REMOVE EXIST. CB AT +79, LT 40.1' (SUBSID.)
CONST. 198' X 12" PERF. CORR. POLY. PIPE UNDERDRAIN
CONST. UL-2 HEADWALL AT +00, LT 38.1'
CONST. 5' W X 10' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST 4' DIA. CB-E AT +79, LT 40.1'

GRID N

MATCH TO SHT WET 11

MATCH TO SHT WET 13

EXIST. L.A.R.O.W.

CLEARING LINE (TYP.)

SLOPE LINE

118 PF01/4E

BN

U52S

DNU52S-CCMP

12" bep CMP

12" UND

108 PEM1Ex

I.S.

BO

24"rcp

I-89 SB

15" PE 1262 1263 1264 15" PE 1265 1266 15" PE 1267 1268 1269 1270 1271 1272 1273 1274 1275

6" UND

119 PSS1/4E

110 PF01/4E

CLEARING LINE (TYP.)

SLOPE LINE

6" UND 6" UND

I-89 NB

1264 1265 1266 1267 1268 1269 1270 1271 1272 1273 1274 6" UND 1275 6" UND 1276 1277

24"rcp

SLOPE LINE

117 PF01/4E

120 PF01/4E

EXIST. L.A.R.O.W.

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

WETLAND PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET12	15747wetplans	15747	20	38

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	DATE	STATION

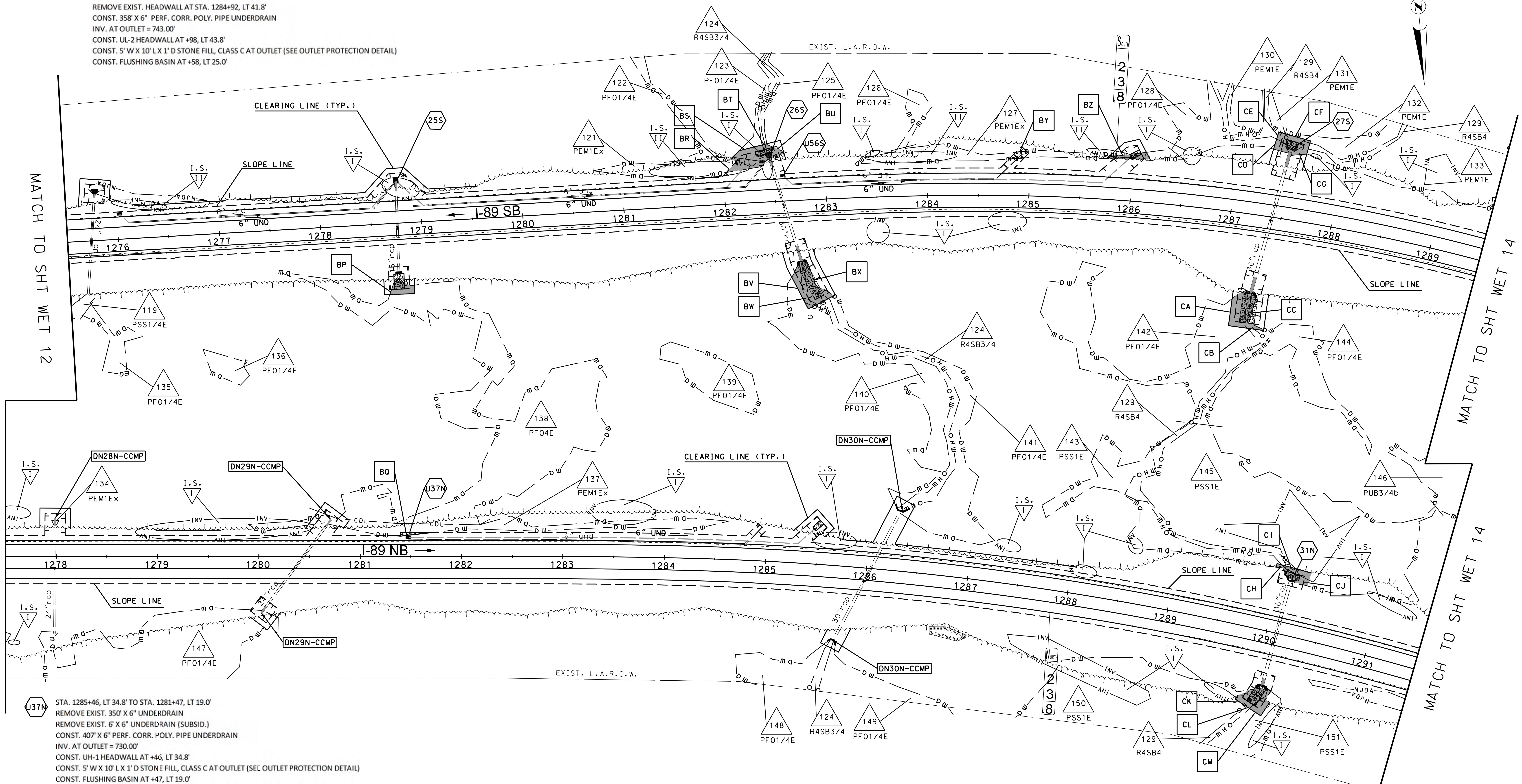
		DATE
SDR PROCESSED		DATE
NEW DESIGN	MMR	DATE 01/23
SHEET CHECKED	DAM	DATE 01/23
AS BUILT DETAILS		DATE

(25S) STA. 1278+75, RT 50.1' TO STA. 1278+77, LT 41.9'
REMOVE EXIST. 8' X 15" RCP AT OUTLET (SUBSID.)
REMOVE EXIST. 8' X 15" RCP AT INLET (SUBSID.)
REMOVE EXIST. CB AT +76, LT 41.9' (SUBSID.)
CONST. PC-3 HEADWALL AT +75, RT 50.1'
CONST. 10' W X 15' L X 2' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. 8' X 15" RCP AT INLET (AS NEEDED FOR CB INSTALL.)
CONST. 4' DIA. CB-E AT +77, LT 41.9' (REQUIRES SLAB TOP)

(U56S) STA. 1285+98, LT 43.8' TO STA. 1282+58, LT 25.0'
REMOVE EXIST. 45' X 6" UNDERDRAIN
REMOVE EXIST. 202' X 6" UNDERDRAIN (SUBSID.)
REMOVE EXIST. HEADWALL AT STA. 1284+92, LT 41.8'
CONST. 358' X 6" PERF. CORR. POLY. PIPE UNDERDRAIN
INV. AT OUTLET = 743.00'
CONST. UL-2 HEADWALL AT +98, LT 43.8'
CONST. 5' W X 10' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. FLUSHING BASIN AT +58, LT 25.0'

(26S) STA. 1282+72, RT 60.4' TO STA. 1282+46, LT 43.3'
REMOVE EXIST. 16' X 30" RCP AT OUTLET (SUBSID.)
REMOVE EXIST. MRM HEADWALL AT +72, RT 60.4'
REMOVE EXIST. 8' X 30" RCP AT INLET (SUBSID.)
REMOVE EXIST. END SECTION AT +46, LT 43.3' (SUBSID.)
CONST. 16' X 30" RCP AT OUTLET
CONST. PC-7 HEADWALL AT +72, RT 60.4'
CONST. STONE FILL, CLASS B AT OUTLET TO ELIMINATE PERCH (SEE OUTLET PERCH REPAIR DETAIL)
CONST. 8' X 30" RCP AT INLET
CONST. 36" ALUM. STEEL END SECTION AT +46, LT 43.3'

(27S) STA. 1287+31, RT 77.1' TO STA. 1287+49, LT 69.2'
REMOVE EXIST. 16' X 36" RCP AT OUTLET (SUBSID.)
REMOVE EXIST. MRM HEADWALL AT +31, RT 77.1'
REMOVE EXIST. 24' X 36" RCP AT INLET (SUBSID.)
REMOVE EXIST. MRM HEADWALL AT +49, LT 69.2'
CONST. 16' X 36" RCP AT OUTLET
CONST. PC-7 HEADWALL AT +31, RT 77.1'
CONST. STONE FILL, CLASS B AT OUTLET TO ELIMINATE PERCH (SEE OUTLET PERCH REPAIR DETAIL)
CONST. 24' X 36" RCP AT INLET
CONST. PC-7 HEADWALL AT +49, LT 69.2'
CONST. 12' W X 8' L X 1' D STONE FILL, CLASS C AT INLET (SEE INLET PROTECTION DETAIL)



(U37N) STA. 1285+46, LT 34.8' TO STA. 1281+47, LT 19.0'
REMOVE EXIST. 350' X 6" UNDERDRAIN
REMOVE EXIST. 6' X 6" UNDERDRAIN (SUBSID.)
CONST. 407' X 6" PERF. CORR. POLY. PIPE UNDERDRAIN
INV. AT OUTLET = 730.00'
CONST. UH-1 HEADWALL AT +46, LT 34.8'
CONST. 5' W X 10' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. FLUSHING BASIN AT +47, LT 19.0'

(31N) STA. 1290+08, RT 54.3' TO STA. 1290+12, LT 53.5'
REMOVE EXIST. 8' X 36" RCP AT OUTLET (SUBSID.)
REMOVE EXIST MRM HEADWALL AT +08, RT 54.3'
CONST. 8' X 36" RCP AT OUTLET
CONST. PC-7 HEADWALL AT +08, RT 54.3'
CONST. STONE FILL, CLASS B AT OUTLET TO ELIMINATE PERCH (SEE OUTLET PERCH REPAIR DETAIL)
REPOINT EXIST. MRM HEADWALL AT +12, LT 53.5'
CONST. 15' W X 8' L X 1' D STONE FILL, CLASS C AT INLET (SEE INLET PROTECTION DETAIL)

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

WETLAND PLANS

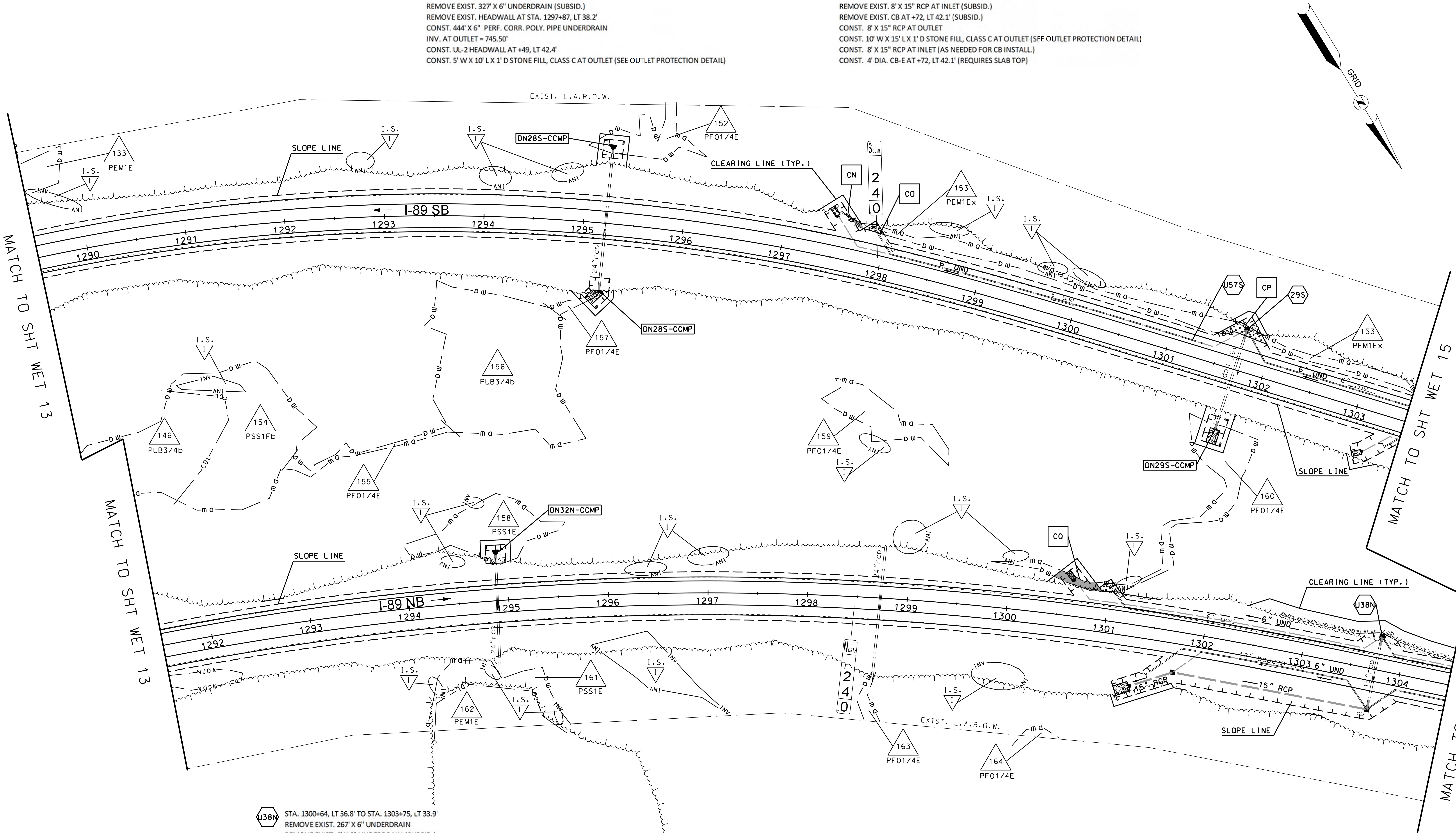
MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET13	15747wetplans	15747	21	38

REVISIONS AFTER PROPOSAL			
NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED		DATE
NEW DESIGN	MMR	DATE 01/23
SHEET CHECKED	DAM	DATE 01/23
AS BUILT DETAILS		DATE

U57S
STA. 1297+49, LT 42.4' TO STA. 1301+72, LT 42.1'
REMOVE EXIST. 30' X 6" UNDERDRAIN
REMOVE EXIST. 327' X 6" UNDERDRAIN (SUBSID.)
REMOVE EXIST. HEADWALL AT STA. 1297+87, LT 38.2'
CONST. 444' X 6" PERF. CORR. POLY. PIPE UNDERDRAIN
INV. AT OUTLET = 745.50'
CONST. UL-2 HEADWALL AT +49, LT 42.4'
CONST. 5' W X 10' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)

29S
STA. 1301+70, RT 62.8' TO STA. 1301+72, LT 42.1'
REMOVE EXIST. 8' X 15" RCP AT OUTLET (SUBSID.)
REMOVE EXIST. 8' X 15" RCP AT INLET (SUBSID.)
REMOVE EXIST. CB AT +72, LT 42.1' (SUBSID.)
CONST. 8' X 15" RCP AT OUTLET
CONST. 10' W X 15' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. 8' X 15" RCP AT INLET (AS NEEDED FOR CB INSTALL.)
CONST. 4' DIA. CB-E AT +72, LT 42.1' (REQUIRES SLAB TOP)



U38N
STA. 1300+64, LT 36.8' TO STA. 1303+75, LT 33.9'
REMOVE EXIST. 267' X 6" UNDERDRAIN
REMOVE EXIST. 6' X 6" UNDERDRAIN (SUBSID.)
REMOVE EXIST. HEADWALL AT 1301+00, LT 35.0'
REMOVE EXIST. 8' X 15" RCP (SUBSID.)
REMOVE EXIST. CB AT +75, LT 33.9' (SUBSID.)
CONST. 8' X 15" RCP (AS NEEDED FOR CB INSTALL.)
CONST. 325' X 6" PERF. CORR. POLY. PIPE UNDERDRAIN
INV. AT OUTLET = 734.50'
CONST. UL-2 HEADWALL AT +64, LT 36.8'
CONST. 5' W X 10' L X 1' D STONE FILL, CLASS C AT OUTLET (SEE OUTLET PROTECTION DETAIL)
CONST. 4' DIA. CB-E AT +75, LT 33.9' (REQUIRES SLAB TOP)

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

WETLAND PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET14	15747wetplans	15747	22	38

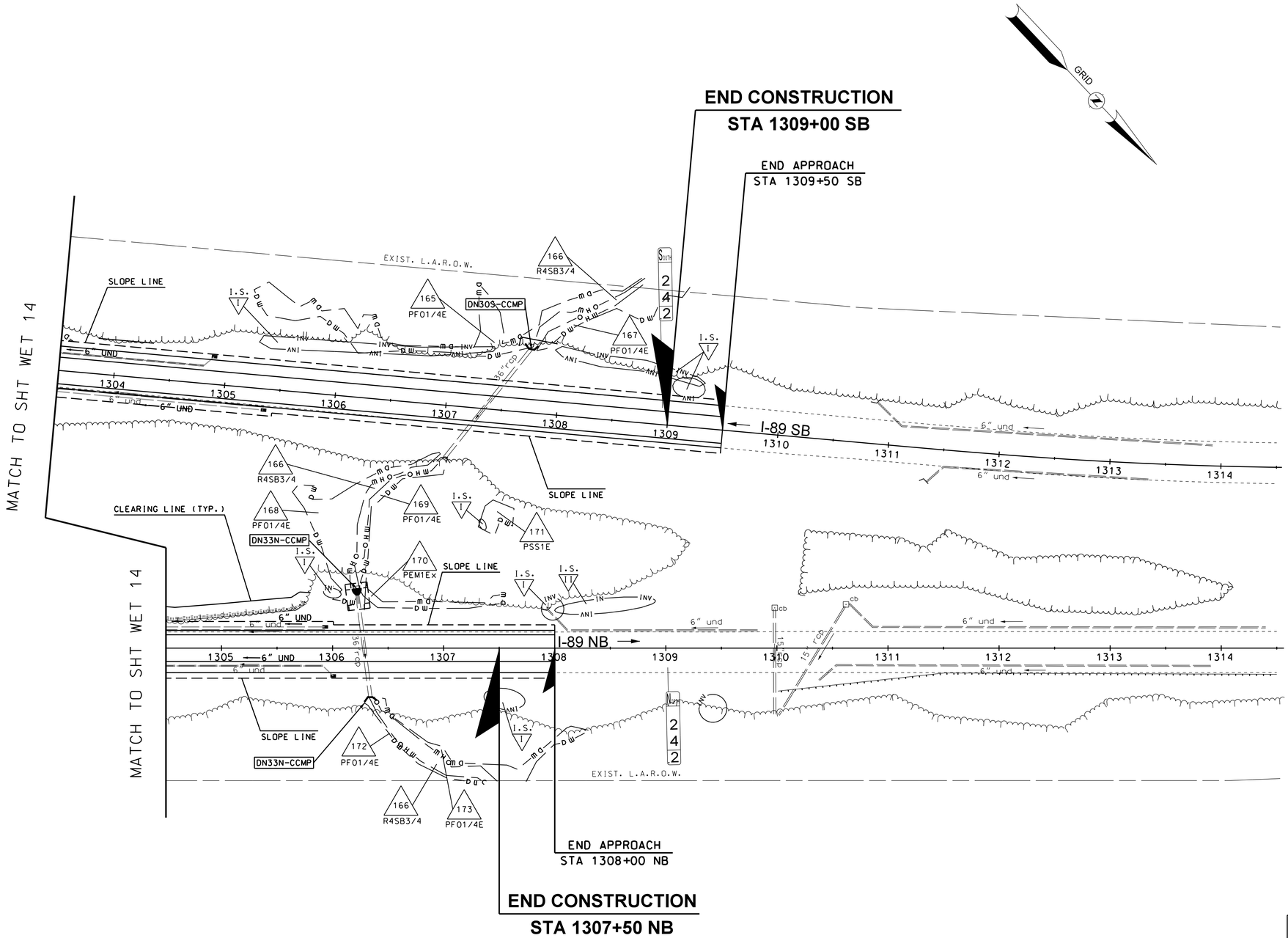
REVISIONS AFTER PROPOSAL			
NUMBER	DATE	STATION	DESCRIPTION

SDR PROCESSED — DATE
NEW DESIGN MMR — DATE 01/23
SHEET CHECKED DAM — DATE 01/23
AS BUILT DETAILS — DATE

REVISIONS AFTER PROPOSAL

NUMBER	DATE	DESCRIPTION
		STATION
		STATION

SDR PROCESSED — DATE
NEW DESIGN — MMR — DATE 01/23
SHEET CHECKED — DAM — DATE 01/23
AS BUILT DETAILS — DATE



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STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

WETLAND PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
WET15	15747wetplans	15747	23	38

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	STATION	STATION	DATE

SDR PROCESSED NAME1 DATE DATE1
NEW DESIGN AWJ DATE 03/23
SHEET CHECKED DAM DATE 03/23

AS BUILT DETAILS DATE

BEGIN CONSTRUCTION
STA 1113+50 SB

BEGIN APPROACH
STA 1113+00 SB

GRID

01 PF01/4E
02 PF01/4E
03 PF01/4E
04 PF01/4E
05 PEM1E
06 PSS1E
07 PF01/4E

ITEM 201.712 - SELECTIVE CLEARING AND THINNING

EXIST. L.A.R.O.W.

CLEARING LINE (TYP.)

SLOPE LINE

24"rcp

15"rcp

6" UND

I-89 SB

I-89 NB

1111 1112 1113 1114 1115 1116 1117 1118 1119 1120 1121 1122 1123 1124

MATCH TO SHT 02

BEGIN APPROACH
STA 1113+00 NB

BEGIN CONSTRUCTION
STA 1113+50 NB

EROSION CONTROL PLAN LEGEND

PERIMETER CONTROL
SILT FENCE
EROSION CONTROL MIX BERM
EROSION CONTROL MIX SOX
TURBIDITY CURTAIN
SHEET PILE
COFFER DAM

NATURAL BUFFER/PERIMETER CONTROL
SILT FENCE
EROSION CONTROL MIX BERM
EROSION CONTROL MIX SOX
TURBIDITY CURTAIN
SHEET PILE
COFFER DAM

CHANNEL PROTECTION
STONE CHECK DAMS
STRAW WATTLES
CHANNEL MATTING
CLASS D EROSION STONE
CLASS C STONE

CLEAN WATER BYPASS
PUMP THROUGH PIPE
DRAIN THROUGH PIPE OR CHANNEL

EXISTING CONTOURS WILL BE REPRESENTATIVE OF PROPOSED CONTOURS IN AREAS WHERE PROPOSED CONTOURS ARE NOT SHOWN

NO IMPACTS ON THIS SHEET

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP01	15747pecpplans	15747	24	38

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	STATION	DATE

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	AWJ	DATE	03/23
SHEET CHECKED	DAM	DATE	03/23

AS BUILT DETAILS — DATE

MATCH TO SHT 01

MATCH TO SHT 03

GRID

EXIST. L.A.R.O.W.

ITEM 201+712 - SELECTIVE CLEARING AND THINNING

CLEARING LINE (TYP.)

SLOPE LINE

I-89 SB

I-89 NB

1125 1126 1127 1128 1129 1130 1131 1132 1133 1134 1135 1136 1137 1138

208

DN3N-CCMP

24" rcp

15" rcp

12" RCP

12" bcpcmp und

6" UND

I.S.

10 PF01E

11 PEM1Ex

08 PEM1E

9 PF01/4E

12 PF01E

B

A

U5S

U5N

NB/PC

INV

ANI

EXISTING CONTOURS WILL BE REPRESENTATIVE OF PROPOSED CONTOURS IN AREAS WHERE PROPOSED CONTOURS ARE NOT SHOWN

50 0 50 100

SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION ∘ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP02	15747pecpplans	15747	25	38

MATCH TO SHT 02

MATCH TO SHT 04

I-89 SB

I-89 NB

EXIST. L.A.R.O.W.

SLOPE LINE

CLEARING LINE (TYP.)

ITEM 201.712 - SELECTIVE CLEARING AND THINNING

GRID

EXISTING CONTOURS WILL BE REPRESENTATIVE OF PROPOSED CONTOURS IN AREAS WHERE PROPOSED CONTOURS ARE NOT SHOWN

SCALE IN FEET 50 0 50 100

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP03	15747pecpplans	15747	26	38

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	DATE	STATION

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	AWJ	DATE	03/23
SHEET CHECKED	DAM	DATE	03/23
AS BUILT DETAILS		DATE	

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	AWJ	DATE	03/23
SHEET CHECKED	DAM	DATE	03/23
AS BUILT DETAILS		DATE	

MATCH TO SHT 03

MATCH TO SHT 05

GRID

MACHINE SCALING LIMIT

CLEARING LINE (TYP.)

SLOPE LINE

EXIST. L.A.R.O.W.

I-89 SB

I-89 NB

DN6S-CCMP

DN7S-CCMP

DNU13S-CCMP

DN8S-CCMP

DN8N-CCMP

DNU10N-CCMP

17 PF01/4E

28 R4SB4/5

29 PF01/4E

30 PF01/4E

31 R4SB3/4

32 PF01/4E

34 PF01/4E

22 PSS1E

33 PEM1E

35 PEM1E

36 PF01/4E

37 PF01/4E

38 PEM1Ex

39 PF01/4E

40 PF01/4E

41 PF01/4E

42 PF01/4E

43 PF01/4E

44 PF01/4E

45 PF01/4E

46 PEM1Ex

47 PF01/4E

48 PF01/4E

49 PF01/4E

50 PF01/4E

51 PF01/4E

52 PF01/4E

EXISTING CONTOURS WILL BE REPRESENTATIVE OF PROPOSED CONTOURS IN AREAS WHERE PROPOSED CONTOURS ARE NOT SHOWN

50 0 50 100

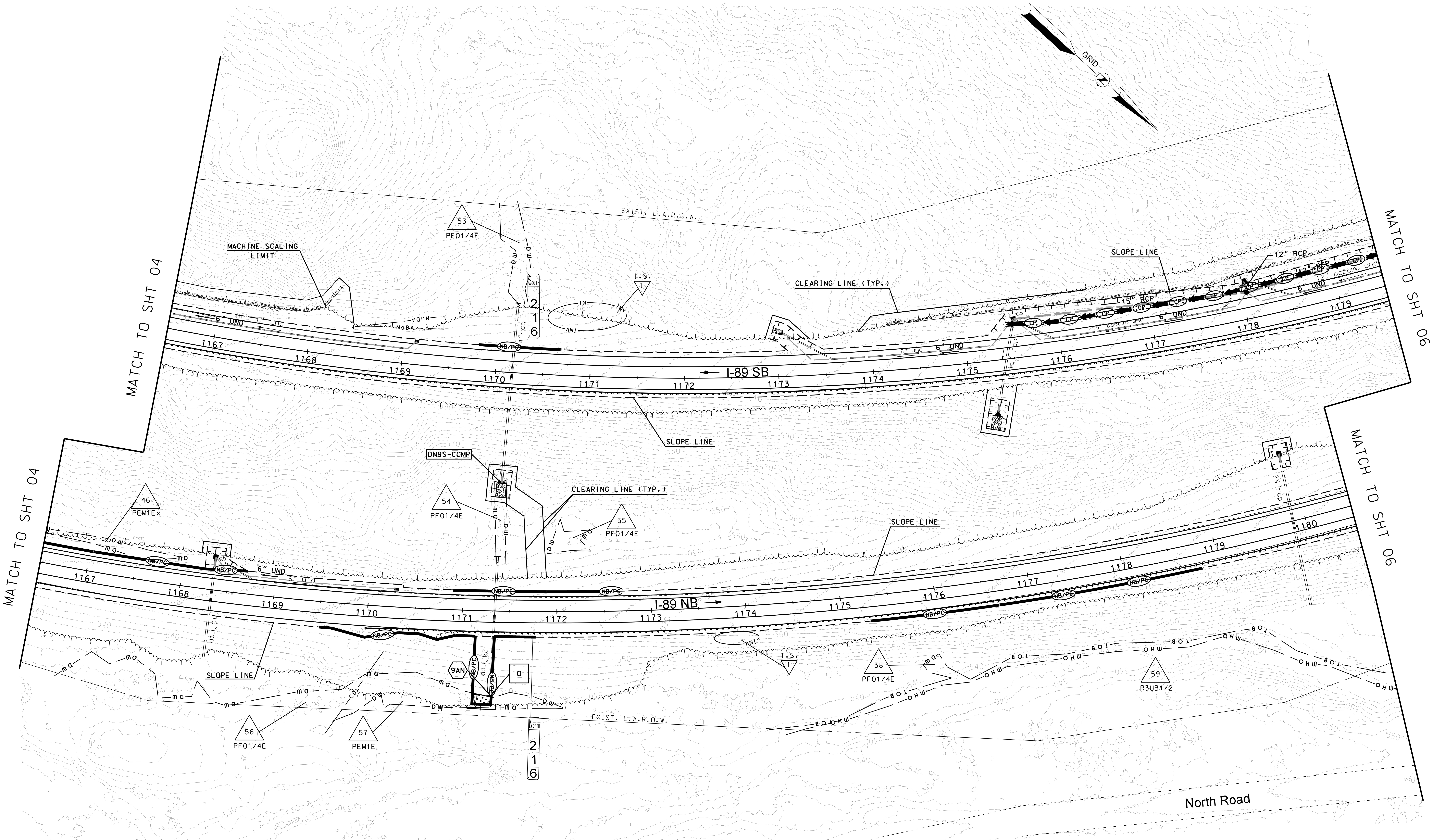
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP04	15747pecpplans	15747	27	38



EXISTING CONTOURS WILL BE REPRESENTATIVE OF PROPOSED CONTOURS IN AREAS WHERE PROPOSED CONTOURS ARE NOT SHOWN

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP05	15747pecpplans	15747	28	38

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	AWJ	DATE	03/23
SHEET CHECKED	DAM	DATE	03/23
AS BUILT DETAILS		DATE	

NUMBER	DATE	STATION	STATION	DESCRIPTION
REVISIONS AFTER PROPOSAL				

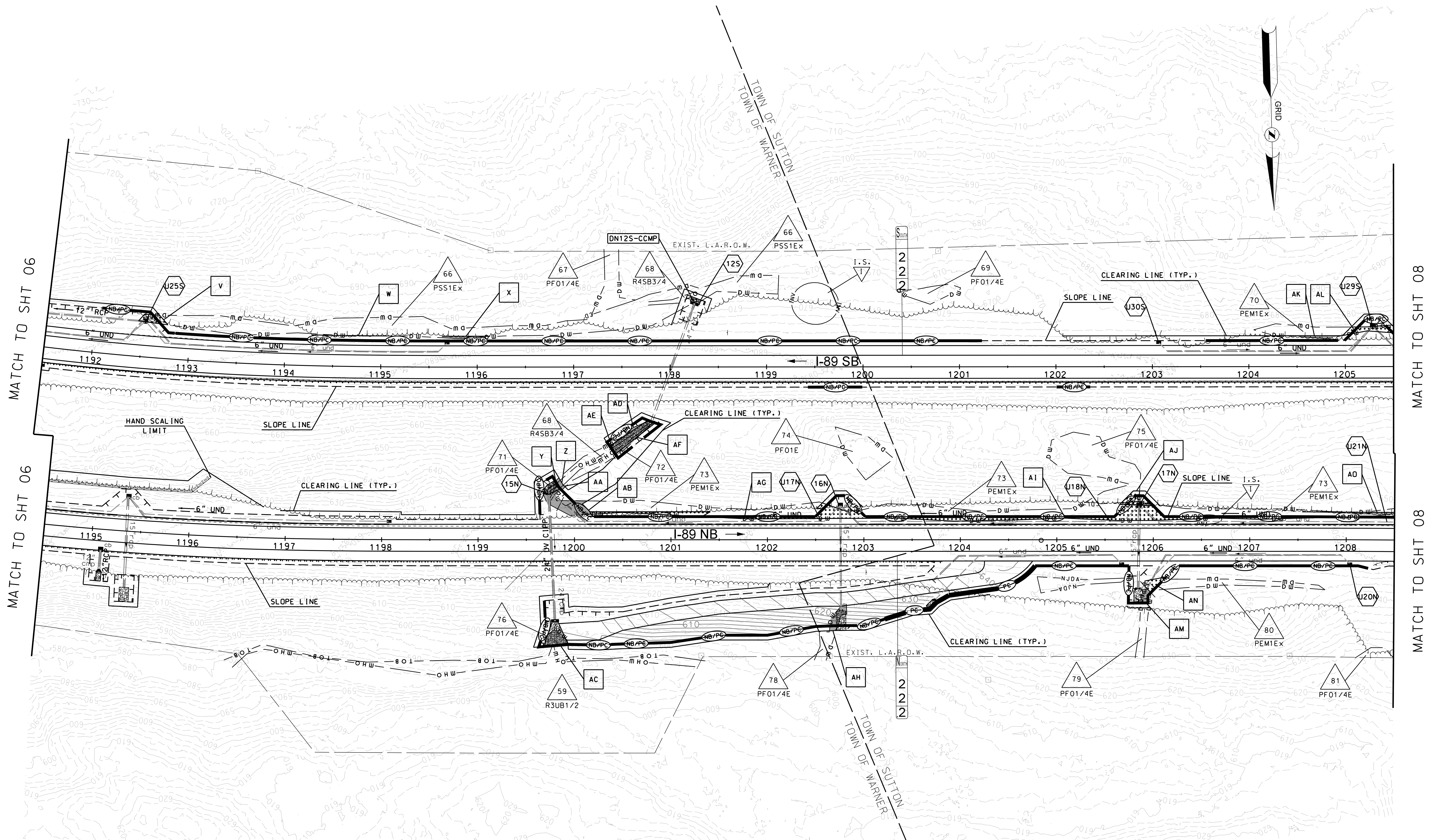
SDR PROCESSED NAME1 DATE DATE1
NEW DESIGN AWJ DATE 03/23
SHEET CHECKED DAM DATE 03/23
AS BUILT DETAILS DATE

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP06	15747pecpplans	15747	29	38



EXISTING CONTOURS WILL BE REPRESENTATIVE OF PROPOSED CONTOURS IN AREAS WHERE PROPOSED CONTOURS ARE NOT SHOWN

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP07	15747pecpplans	15747	30	38

SDR PROCESSED	NAME1	DATE DATE1
NEW DESIGN	AWJ	DATE 03/23
SHEET CHECKED	DAM	DATE 03/23
AS BUILT DETAILS		DATE

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

EXISTING CONTOURS WILL BE REPRESENTATIVE OF PROPOSED CONTOURS IN AREAS WHERE PROPOSED CONTOURS ARE NOT SHOWN

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP08	15747pecpplans	15747	31	38

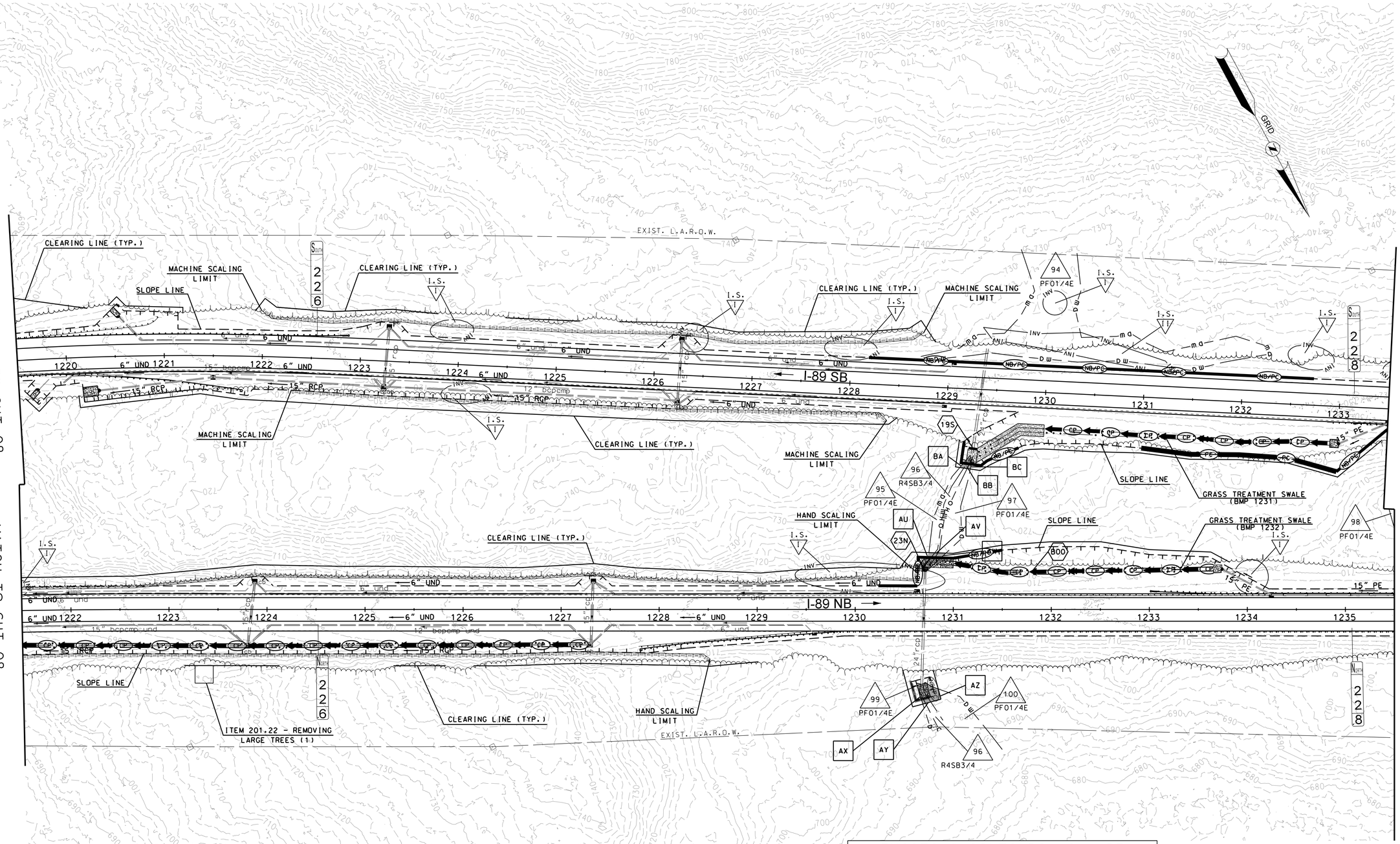
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE DATE1
NEW DESIGN	AWJ	DATE 03/23
SHEET CHECKED	DAM	DATE 03/23
AS BUILT DETAILS		DATE

REVISIONS AFTER PROPOSAL	STATION	DESCRIPTION
NUMBER	DATE	

MATCH TO SHT 08



MATCH TO SHT 10

MATCH TO SHT 08

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	AWJ	DATE	03/23
SHEET CHECKED	DAM	DATE	03/23
AS BUILT DETAILS		DATE	

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP09	15747pecpplans	15747	32	38

MATCH TO SHT 09

MATCH TO SHT 11

EXIST. L.A.R.O.W.

SLOPE LINE

CLEARING LINE (TYP.)

MACHINE SCALING LIMIT

I-89 SB

I-89 NB

North Road

EXISTING CONTOURS WILL BE REPRESENTATIVE OF PROPOSED CONTOURS IN AREAS WHERE PROPOSED CONTOURS ARE NOT SHOWN

SCALE IN FEET 50 0 50 100

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION ∘ BUREAU OF HIGHWAY DESIGN

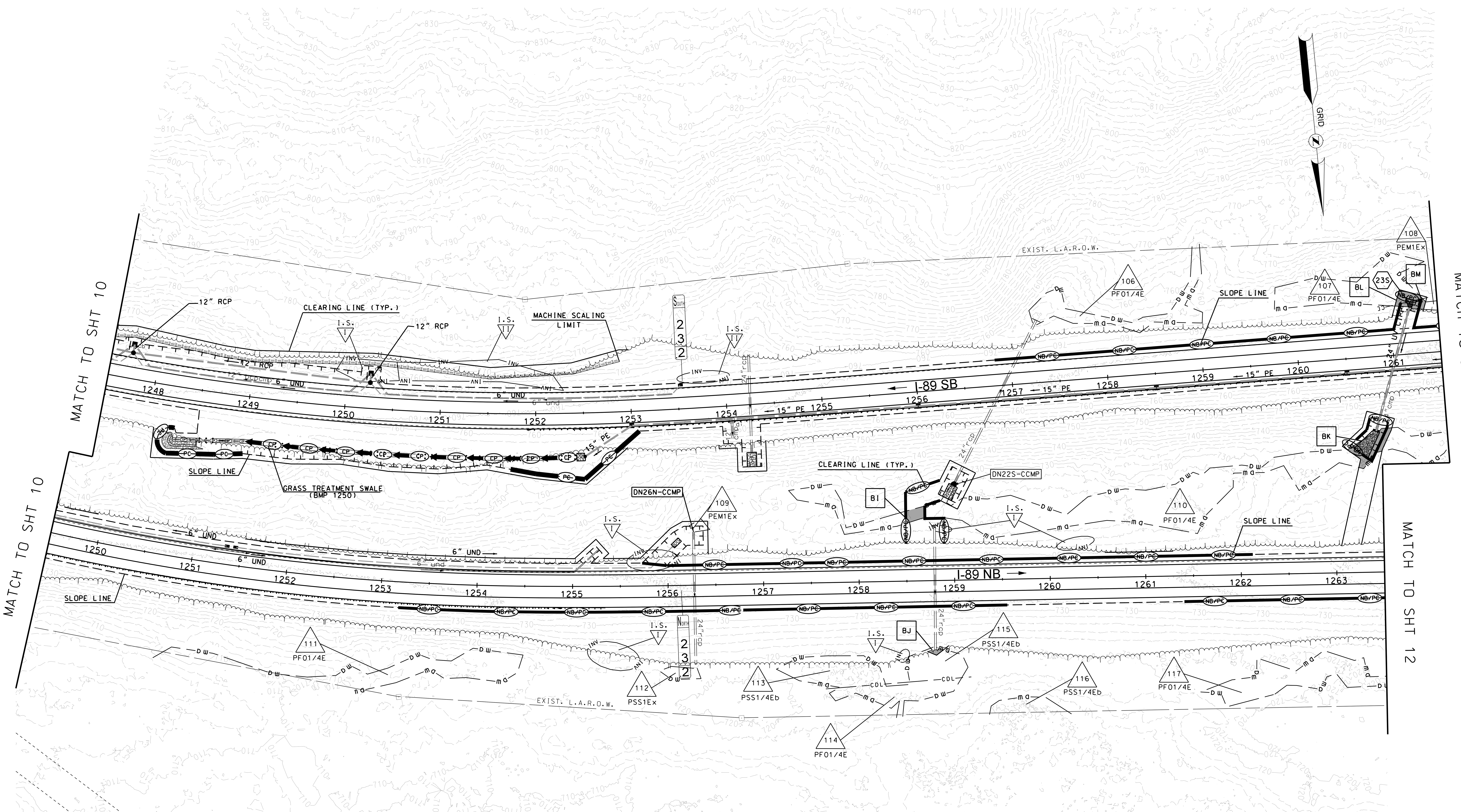
EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP10	15747pecpplans	15747	33	38

REVISIONS AFTER PROPOSAL

NUMBER	DATE	DESCRIPTION	STATION

SDR PROCESSED	NAME1	DATE DATE1
NEW DESIGN	AWJ	DATE 03/23
SHEET CHECKED	DAM	DATE 03/23
AS BUILT DETAILS		DATE



EXISTING CONTOURS WILL BE REPRESENTATIVE OF PROPOSED CONTOURS IN AREAS WHERE PROPOSED CONTOURS ARE NOT SHOWN

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP11	15747pecpplans	15747	34	38

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	AWJ	DATE	03/23
SHEET CHECKED	DAM	DATE	03/23
AS BUILT DETAILS		DATE	

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	STATION	DATE

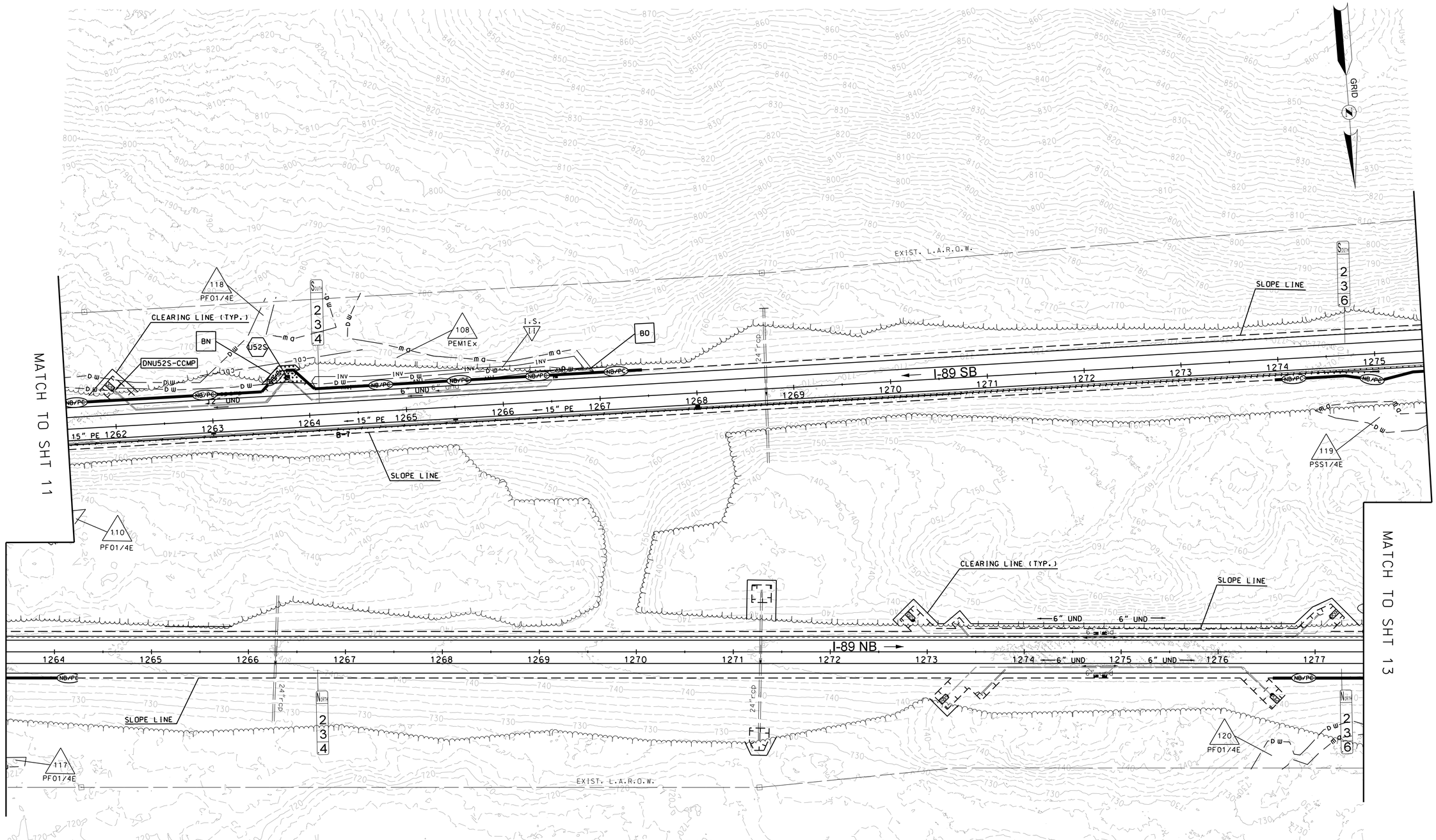
	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	AWJ	DATE	03/23
SHEET CHECKED	DAM	DATE	03/23
AS BUILT DETAILS		DATE	

MATCH TO SHT 11

MATCH TO SHT 11

MATCH TO SHT 13

MATCH TO SHT 13



EXISTING CONTOURS WILL BE REPRESENTATIVE OF PROPOSED CONTOURS IN AREAS WHERE PROPOSED CONTOURS ARE NOT SHOWN

50 0 50 100
SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP12	15747pecpplans	15747	35	38

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	AWJ	DATE	03/23
SHEET CHECKED	DAM	DATE	03/23
AS BUILT DETAILS		DATE	

MATCH TO SHT 12

MATCH TO SHT 12

MATCH TO SHT 14

MATCH TO SHT 14

I-89 SB

I-89 NB

CLEARING LINE (TYP.)

SLOPE LINE

EXIST. L.A.R.O.W.

GRID

DN28N-CCMP

DN29N-CCMP

DN30N-CCMP

EXISTING CONTOURS WILL BE REPRESENTATIVE OF PROPOSED CONTOURS IN AREAS WHERE PROPOSED CONTOURS ARE NOT SHOWN

50 0 50 100

SCALE IN FEET

FUSS & O'NEILL

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
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EROSION CONTROL PLANS

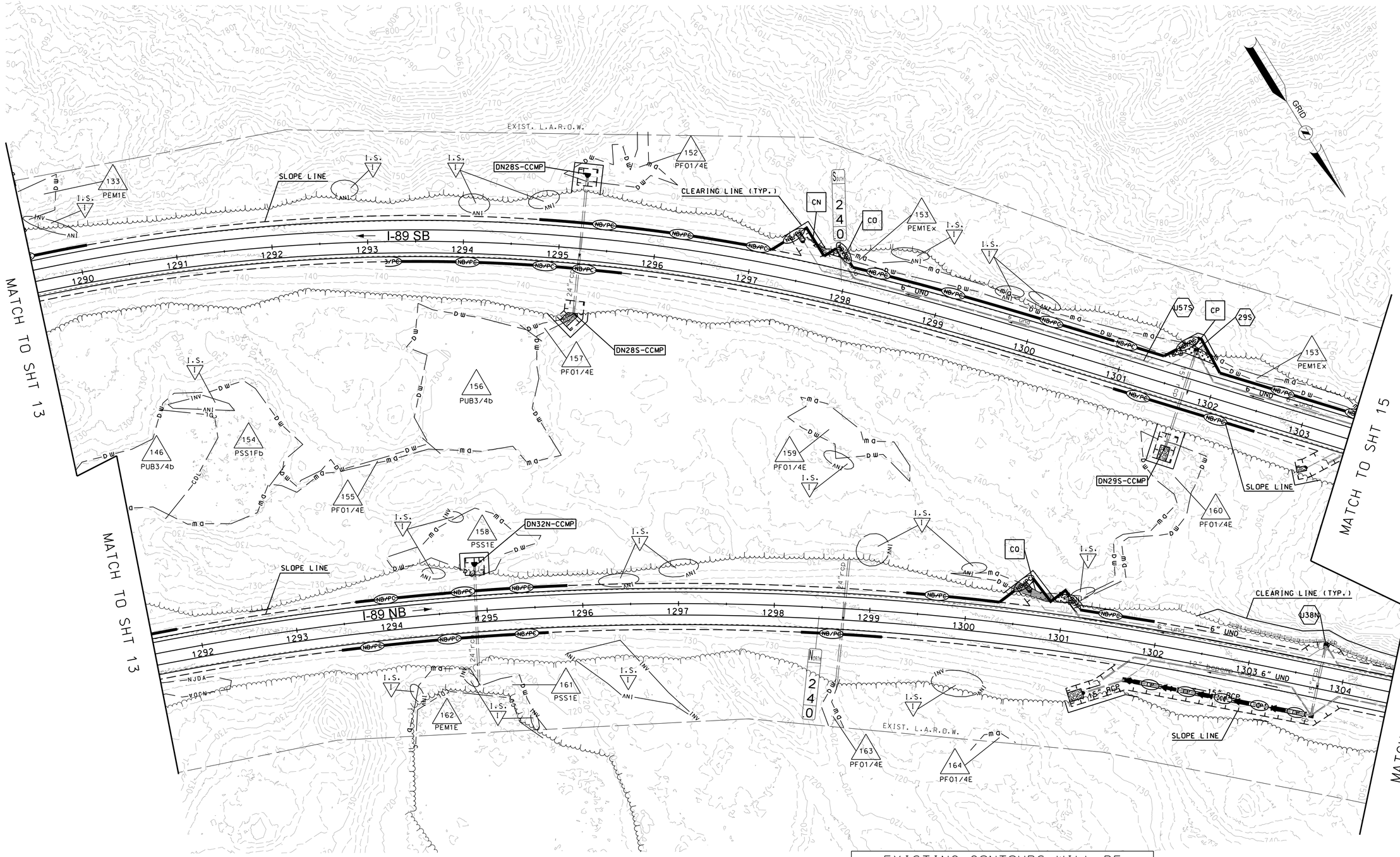
MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP13	15747pecpplans	15747	36	38

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	STATION	DATE

	NAME1	DATE	DATE1
SDR PROCESSED		DATE	
NEW DESIGN	AWJ	DATE	03/23
SHEET CHECKED	DAM	DATE	03/23

AS BUILT DETAILS — DATE



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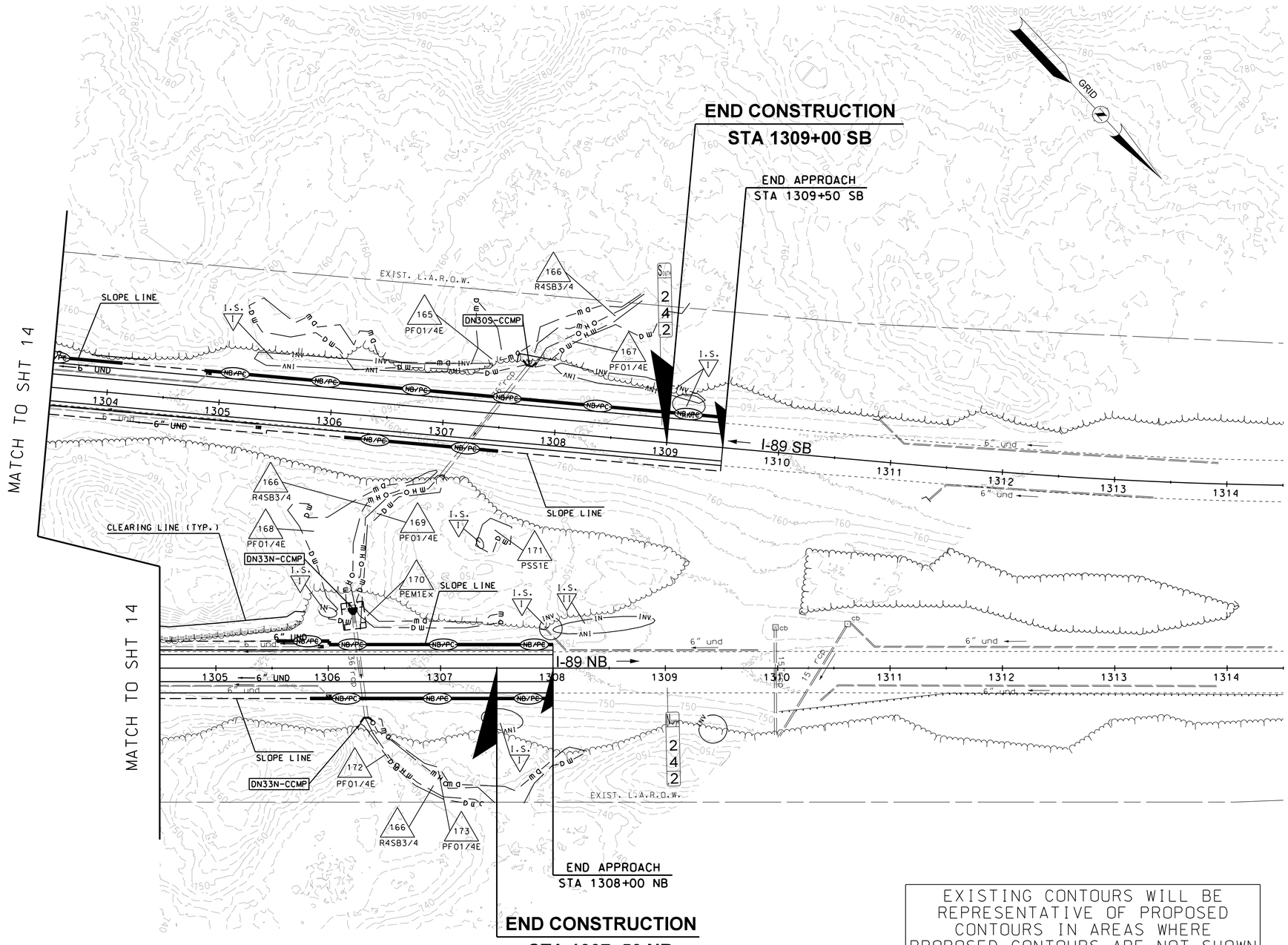
DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP14	15747pecpplans	15747	37	38



REVISIONS AFTER PROPOSAL

NUMBER	DATE	DESCRIPTION	STATION

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	AWJ	DATE	03/23
SHEET CHECKED	DAM	DATE	03/23

AS BUILT DETAILS — DATE

STATE OF NEW HAMPSHIRE
WARNER & SUTTON
DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

FUSS & O'NEILL

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PECP15	15747pecpplans	15747	38	38